The 4th International Symposium on Materials and Sustainable Development ISMSD2019 (CIMDD2019), will include a 3-day Conferences (12 - 14 November). Organized by the Research Unit: Materials, Processes and Environment (www.urmpe.dz)and M'hamed Bougara University of Boumerdes, this symposium follows the success of CIMDD 2013-2015-2017 and continues the traditions of the highly successful series of International Conferences on the materials, processes and Environment. The Symposium will provide a unique topical forum to share the latest results of the materials and sustainable development research in Algeria and worldwide. It brings together the engineering, physics, and material science communities working on advanced materials and their applications. Thus, during two days, the various scientific disciplines concerned by Materials and Sustainable Development will be focused on 4 main topics.

Topic 1: Nanomaterials, Nanotechnology and Emerging Smart Materials ;
Topic 2: Cementitious materials and Materials Properties ;
Topic 3: Renewable energy, development sustainable, Recycling and Environment
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Dans le cadre des manifestations scientifiques se déroulement au sein de l'Université M'Hamed Bougara de Boumerdes (UMBB), l'Unité de Recherche : Matériaux-Procédés et Environnement/UR-MPE de la Faculté de Technologie, organise, du 12au14 novembre 2019, le 4éme colloque international sur les matériaux et le développement durable (4éme CIMDD).

Ce rassemblement scientifique, technologique et environnemental s'évertuera à être mélioratif en tâchant :

1. D'approfondir le thème relatif aux nanomatériaux et à leur incorporation dans d'autres matériaux.
2. De s'intéresser au développement durable en se penchant sur les énergies renouvelables, le recyclage et la revalorisation des matériaux dont la qualité contribuera à l'amélioration de la protection de l'environnement.
3. D'approfondir la complémentarité Université-Industrie en multipliant les contacts entre elles afin d'apporter éventuellement des solutions aux problèmes entravant les processus technologiques.
4. De dynamiser le partenariat, la collaboration et le développement des relations entre notre université et certaines universités étrangères en travaillant sur des projets communs pour permettre, entre autre, à nos doctorants de bénéficier des cotutelles et de faciliter les échanges entre nos étudiants et les étudiants étrangers.
5. De favoriser les liens entre les chercheurs nationaux qui prendront connaissance des travaux présentés en les dissertant pour s'en inspirer, dans la mesure du possible.
6. De choisir les meilleurs travaux en récompensant les lauréats.

A cet effet, ce colloque s'articulera sur :

Thème 1: Nanomatériaux, Nanotechnologie et Matériaux Intelligents Emergents

Thème 2: Matériaux Cimentaires et propriétés des Matériaux

Thème 3: Energies Renouvelables, Développement Durable, Recyclage et Environnement

Thème 4: Procédés et Transformations des Matériaux.

Nous vous invitons donc à prendre une part active à ce colloque en vue d'assurer sa tenue biennale qui ne manquera pas d'augmenter sou audience et d'être un gage de son succès.

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KeynoteSpeakers

Assoc. Prof. Ma'anAlkhatib
International Islamic University Malaysia

Title: ***Sustainable wastewater treatment: Fats, Oil and Grease (FOG) causes and treatment: as a case study***

Short-Bio: ***Assoc. Prof. Dr. Ma'anAlkhatib is the Chair of River of Life (ROL) Flagship Project at International Islamic University Malaysia. He is the founder and chair of Friends of Pusu River and cofounder and Assistant secretary of the national NGO, Friends of Klang River Basin. He served as Coordinator for Nanoscience and Nanotechnology Research Group (NANORG) from 2007-2015. He also served as postgraduate, final year project, integrated design project coordinator. He is currently active member of NANORG and Bioenvironmental Engineering Research Centre (BERC). He obtained his Ph.D. in chemical and environmental engineering. His research focus is in areas lead to sustainable environment. He conducts research on sustainable water and wastewater treatment and nanomaterials (activated carbon, CNT, graphene, nanoparticles) for environmental applications. He has been working actively and closely with public and private institutions such as Indah Water (IWK, Malaysia's national sewerage company), NanoMalaysiaBerhad, and MYCDNET.*** *Email:* ***maan@iium.edu.my***

Pr. Alex LI
Civil Engineering Laboratory, University of Reims Champagne-Ardenne, France

Title: Renforcement des Poutres Continues en Béton Armé par Matériaux Composites

Short-Bio: ***Prof. Alex Li is Director of Civil Engineering Laboratory - University of Reims - Champagne-Ardenne.***

Dr. Sadia RADJI
Research Team: Physic and Chemistry of Polymers (UMR 5254), University of Pau, France

Title: Polymères biosourcés: stratégies d'élaboration, perspectives et applications

Short-Bio: ***Dr. SadiaRADJI is Ass. Prof, PhD, Department of Physics, University of Pau and Adour / IPREM-EPCP, Since September 2010. She is IPREM committee member and the training team of the LMD doctoral school "Chemistry and physics of polymers" (UMBB-Algeria).***

Topic 1: Nanomaterials, Nanotechnology and Emerging Smart Materials

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REMOVAL OF CATIONIC DYE FROM AQUEOUS SOLUTIONS BY A COMPOSITE MATERIAL

Saidia Hesna (1), Halladja Sabrina (1), Ayadi Hassan (1), Harbi Mouhssin (1)

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ABSTRACT

The heterogeneous Fenton process is highly attractive for the removal of hardly organic compounds such as dyes used in the textile industry, while preventing the management of iron sludge generated by a conventional Fenton process. In this study, we synthesized a composite by the Co-Precipitation method using Graphene Oxide functionalized with Iron Oxides GO-Fe3O4 particles. The performance of this elaborate composite was evaluated for the degradation of Methylene Blue (MB) as an organic dye model. The textural properties of the composite have been characterized by the x-ray diffraction (XRD) which indicates the presence of a magnetite phase and a good dispersion of the magnetite on the surface of the Purified Graphene. Experimental results show that the use of this system (GO-Fe3O4/H2O2) reached the almost total discoloration rate (99%) after 90 minutes of treatment. The solution can be decolorized to nearly colorless. The removal process is fast and more efficient at a lower temperature T= 22Â°C and pH = 2, 3. The kinetic study shows that the decolorization obeys to the pseudo - first order model. Similarly, we were able to demonstrate the good strength of the catalyst given its stability and ability to degrade the dye after three consecutive test cycles.

Keywords: *Discoloration., Heterogeneous Fenton, Methylene Blue, Composite*

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SOL–GEL SYNTHESIS OF SN DOPED ZNO THIN FILMS AND THIER STRUCTURAL, MORPHOLOGICAL AND OPTICAL PROPRIETIES

Seddik Bouabida (1) (2), Salima Benkara (3) (4), Ghamri Houda (5)

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ABSTRACT

The purpose of this work is to verify the effects of tin dopant with various percentages on the structural, morphological and optical properties of ZnO thin films prepared on glass substrates by the sol-gel method with dip-coating technique. X-ray diffraction (XRD), Scanning ElectronÂ Microscopy (SEM), Atomic Force Microscopy (AFM) and Uv-visible spectroscopy are used to characterize the samples. The structural analysis by X-ray diffraction showed that the crystallite's size of our deposited films is Nano-metric, the characterization by SEM microscopy were used to observe the effect of doping on grain size, and showed a completely different morphology. The optical properties by Uv-visible spectroscopy showed that the deposited films have a transmittance between 65 and 90%, and showed that Sn doping increases the energy band gap. AFM image showed that ZnO thin films having a smooth surface morphology.

Keywords: *Zno thin films, Sn doped ZnO, Optical analysis, XRD analysis, AFM analysis.*

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SYNERGY BETWEEN FILLERS IN PLA/TIO2/AL2O3 NANOCOMPOSITES FILMS

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ABSTRACT

Improving properties of poly (lactic acid) (PLA) by reinforcing it with inorganic nanofillers has been a wide field of research over these last years. This study aims to demonstrate the synergetic effect of a mixture of two inorganic fillers such as titanium dioxide (TiO2) and Alumina (Al2O3) on the thermal and nanomechanical of the widely studied PLA. The structural properties of nanocomposites have been analyzed with FT-IR, XRD, SEM, and UV-visible spectrophotometry. the results showed a uniform dispersion of TiO2 NPs in the PLA/TiO2 matrix due to the presence of strong interactions between the carbonyl group of PLA and oxygen atom of TiO2 and a high density of Al2O3 aggregates in the PLA/Al2O3 matrix and a marked predominance of agglomerates when TiO2 and Al2O3 were added simultaneously to PLA matrix. Furthermore, Differential Scanning Calorimetry (DSC) analysis showed that glass transition (Tg) and melting (Tm) temperatures of these nanomaterials were slightly affected by nanofillers addition compared to neat PLA. The nanoindentation analysis revealed that these nanofillers have a positive impact on the nanomechanical properties of the PLA/TiO2, PLA/Al2O3 or PLA/TiO2/Al2O3 nanocomposites films. Â

Keywords: *PLA, nanofillers, nanomechanical properties, thermal properties*

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PREPARATION AND CHARACTERIZATION OF NANOCOMPOSITE MEMBRANES BASED ON COPPER OXIDE

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ABSTRACT

The preparation of nanocomposite membranes based on PVC (Polyvinyl chloride) has been studied for the separation of aromatic-aliphatic mixtures by the pervaporation technique. The PVC has been chosen as an organic matrix because it is a low-cost polymer, film-forming and above all it has a very high affinity to wards aromatics. In order to improve the performance of pure PVC films, nanocomposite membranes have been prepared by incorporating different percentages of copper oxide nanoparticles (CuO) induced as inorganic filler into the polymeric matrix. In this study, we present the results obtained with nanocomposite membranes based on PVC-%CuO. The transport properties of these membranes were characterized by isothermal sorption and pervaporation measurements Flux and selectivity of binary mixtures (toluene-heptane).

Keywords: *isothermal sorption, aliphatic, aromatic, Nanocomposite membranes, pervaporation.*

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STUDY OF THE STABLITY OF INTELLIGENT MATERIAL PLATES (FGM) SIMPLY SUPPORTED

Bouanati Soumia (1), Benrahou Kouider (1), Bourada Fouad (1) (2), Bourada Mohamed(1), Abdelouahed Tounsi (1)

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ABSTRACT

In this investigation, the stability analysis of the simply supported smart material (FGM) plates is presented using a refined HSDT shear deformation theory. The current model takes into account the effect of traverse shear deformation without the introduction of shear correction factors. The equilibrium equations are determined and solved using the virtual works principle and the Navier method, respectively. The accuracy of this model is confirmed by comparing the results with those of the literature. Several examples will be presented to show the different parameters influencing the stability of functionally graduated plates simply supported.

Keywords: *Stability, intelligent materials, HSDT theory, Shear effect, Navier.*

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STUDY OF TWO ORTHOCRYL CARBON COMPOSITE MATERIALS AND ORTHOCRYL GLASS FOR MEDICAL USE

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ABSTRACT

Our team of Composite Materials researchers in collaboration with the company ONAAPH (Office Nationale d'Appareillage et d'Accessoires pour Personnes Handicapées) has set the objective of studying and contributing to the improvement of orthopedic prostheses. ONAAPH has made a considerable effort to ensure the comfort of the motor handicapped. To this end, it has created the latest generation of prostheses made of carbon, which effectively meets the needs of patients. The research that is conducted consists in studying the characteristics of carbon fiber and orthocryl resin composites. This is to improve the characteristics of the materials and to better adapt them to the needs of the motor handicapped. To carry out the investigations and better understand the behaviour of these materials, mechanical tests with the support of electron microscopy (SEM) have been performed. The initial results obtained allow the full understanding of the behaviour of these materials. The different types of conventional degradation (matrix and fibre failure, debonding and interlaminar delamination) were observed. Despite its degradation, the material retains good cohesion and meets the requirements of prostheses. The same study on another composite material, glass fiber and orthocryl resin was also carried out. This is in order to make a comparative study on the two materials. Since this orthocryl glass material was previously and even now used by the company to make prostheses.

Keywords: *debonding, composites, orthocryl resin, glass fiber, carbon fiber, delamination*

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INVESTIGATIONS ON THE INFLUENCE OF DIFFERENT ZNO THIN FILM DEPOSITION PARAMETERS ON THE OPTICAL AND MECHANICAL PROPERTIES OF GLASS

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ABSTRACT

Not only one main drawback of glass, limiting its use for some applications, is its brittle fracture behavior, directly depending of surface flaws, but furthermore, in areas like the South of Algeria (Sahara), sand wind is responsible for huge surface degradation of car and window glass. The impacts induced by the sand particles on the surface significantly reduce the breaking strength and in addition the light transmission is reduced by induced light diffusion. In this work we try to counterbalance the sand wind effect by strengthening the glass by the reinforcement of its surface by thermo-chemical method: thin layer deposition by spray pyrolysis. Optimization of parameters such as deposition time and substrate temperature is important for obtaining ZnO layers with optimal properties. Here we present a study about the induced effects of precursor type and concentration on optical and mechanical properties of ZnO thin films. We performed X-ray diffraction measurements and used it as a tool to get an insight on structural characteristics and homogeneity of ZnO layers. Then different techniques were used to evaluate the influence of the spray-pyrolysis parameters on the surface characteristics of the reinforced glasses such as Vickers indentation, solid particle erosion test, 4-point bending test, and spectroscopy.

Keywords: *Strengthened glass, Glass, spray pyrolysis.*

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EFFECT OF ZINC OXIDE NANOPARTICLES DOPED WITH CO AND NI ON THE OPTICAL PROPERTIES OF PS/ZNO NANOCOMPOSITES THIN FILMS.

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ABSTRACT

In this piper, the Optical properties of thin films of PS/ ZnO were examined as function of the Co and Ni dopants elements of ZnO nanoparticles with a concentration of 10 wt%. The ZnO nanoparticles non doped and doped with Co and Ni have been successfully synthesized by Co-precipitation method using dehydrated zinc acetate and sodium hydroxide as precursors. X-ray diffraction characterization confirmed a hexagonal structure of the obtained ZnO nanoparticles. Thin polymer films were prepared by a simple technique of spin-coating on glass slides by mixing ZnO nanoparticles with polystyrene (PS) polymer as matrix. The pure ZnO and ZnO doped (Co and Ni) nanoparticles with a concentration of 10wt% in the polystyrene matrix were used as filler in the nanocomposites. However, thin films of commercially available polystyrene have also prepared. UV-Vis spectra characterization confirmed that the thin films PS/ZnO nanocomposites were highly transparent in the visible region and exhibited excellent UV-absorbing properties. The basic optical properties and optical constants of the PS/ ZnO nanocomposites with thickness in the range of (526-710) nm have been investigated. The transmittance and absorbance spectra were measured in the wavelength range of (300-900) nm. The optical band gap Eg was determined; it has been found that the gap Eg value of PS/ZnO10% Ni is the same as pure PS thin films and decreases for thin films of PS/ZnO and PS/ZnO 10% Co. The refractive index which has a value of 1,017 for pure PS, was increased in all the samples of nanocomposites PS/ ZnO (pure and ZnO doped with Co and Ni) it was estimated to be between 1, 87 to 1, 96.

Keywords: *thin films, precipitation, Co, Keywords: nanoparticles, optical energy gap, refractive index.*

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EVOLUTION OF THE STRESSES DURING FORMATION OF NICKEL SILICIDES IN THIN LAYER FOR MICROELECTRONIC APPLICATION

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ABSTRACT

The study of metal-silicon interaction is of great importance, particularly in silicide applications as a Schottky barrier or ohmic contact in integrated circuit technology. Silicides are widely used at the beginning of this century, when Moisson had prepared the first silicide. The solid state reaction between metallic thin films with a silicon substrate still needs to be investigated in the thin film regime. X-ray diffraction and substrate curvature measurements were combined during in situ synchrotron experiments to follow the reaction kinetics and the evolution of stresses during phase formation. Ni/Si is a model system ; The phases which form : d-Ni2Si ;q-Ni2Si and NiSi with different orientations. The results show that the Zhang-d'Heurle model explains the stress evolution during annealing, which comes from the competition of two mechanisms : the development of compressive stress due to the formation of a new phase and the stress relaxation of already formed silicides. The study of Ni thin films shows that there is a critical thickness below which the phase sequence and texture are changed. Using different techniques, it has been shown that from 235 °C, the d-NiSi phase grows as a homogeneous and continuous layer. Then increasing temperature, The q-Ni2Si phase coexists with different morphologies : islands penetrating the substrate or rods.

Keywords: *strain, stress, thin films, ultra, silicide, texture, XRD.*

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GREEN AND SONOCHEMICAL SYNTHESIS OF ZINC OXIDE NANOPARTICLES USING GLOBULARIA ALYPUM PLANT EXTRACT FOR PHOTOCATALYTIC AND ANTIMICROBIAL APPLICATIONS

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ABSTRACT

In recent years, the synthesis of metal oxides nanoparticles by biological methods has received more attention; as aneco-friendly and cost effective alternative approaches. In this work we studied the effect of plant extract concentration on the properties of zinc oxide nanoparticles synthesized from zinc nitrate, Globularia Alypum plant extract and sodium hydroxide and as a precursor; save solvent and catalytic agent respectively using sonochemical method. The nanoparticles were characterized using X-ray diffractometer (XRD), scanning electron microscopy (SEM), Raman spectroscopy, Fourier transform infrared (FT-IR) and uv- visible spectrophotometers. The XRD diffraction analysis show that all samples have a hexagonal wurtzite structure with (101) preferential orientation with an average grain size of 10 nm. The scanning electronic microscopy shows that the ZnO nanoparticles have an agglomerate spherical tendency shape. All the E2 (high) peaks of ZnO samples grown in our experiment have slight blue-shif. From FT- IR analysis, the band located around 621 cm-1 can be attributed to the Zn-O stretching mode, and the Uv-vis spectra indicate that the optical band gap energy increases up to 3.5 eV when the grain size decrease.

Keywords: *Antimicrobial, ZnO Nanoparticles, Globularia Alypum, Sonochemical, Green synthesis, Photocatalytic*

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STRUCTURAL AND ELECTRONIC PROPERTIES OF FEW-LAYER GRAPHENE (FLG) AND TWISTED LAYER GRAPHENE (TLG) BY FIRST-PRINCIPLES CALCULATIONS

Si Abdallah Fatma (1), Bouamama Khallil (2), Farhat Samir (3), Cherif Salim Mourad (4)

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ABSTRACT

The Graphene is a two-dimensional material of great importance due to its unique mechanical, thermal and electronic properties. In this study, we used density functional theory to investigate the structural and electronic properties of few-layer graphene (FLG) and twisted layer graphene (TLG) where one layer is rotated relative to the other. The calculations were performed in the framework of the DFT as implemented in VASP code. The ion-electron interaction was described by PAW pseudopotentials and the exchange-correlation functional with corrections for Van der Waals interaction (PBE-VdW) was used. Our calculations on different structures of graphene of the bilayer AB 0º and the trilayer ABA 0º and the twisted ones AB 21º, ABA 21º, confirm obviously that the Dirac point is found in K points of the Brillouin zone and at the Fermi level, which it is the exceptional property of pure graphene, but also that the relative rotation of the layers results in "Moiré materials" that could exhibit new electronic and magnetic properties.

Keywords: *Van der Waals, DFT, twist, Graphene, Dirac point.*

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INFLUENCE OF PRECURSORS ON HYDROTHERMAL GROWTH OF ZNO NANOSTRUCTURES ON SEED LAYER GLASS SUBSTRATES

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ABSTRACT

Zinc Oxide (ZnO) nanostructures were grown on ZnO seed layer deposited glass, by hydrothermal method. The effect of precursors (zinc nitrate, zinc chloride and zinc sulfate) on the grown ZnO nanostructures was studied. The structural, morphological and optical properties were characterized by XRD, FESEM, AFM and UV-visible spectroscopy. The elemental compositions of the samples were investigated by EDS.XRD results show that ZnO structures are polycrystalline hexagonal wurtzite with high crystal quality. SEM images reveal that the morphologies of the nanostructures are greatly influenced by the effect of precursors. EDS measurements confirm the purity of the elaborated samples by the presence of only Zn and O atoms in the samples. UV-vis spectra display high absorption in the UV region and high trasparency in the visible region.

Keywords: *Hydrothermal, Nanostructure, ZnO, Seed layer*

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TEMPERATURE AND FREQUENCY-DEPENDENT CONDUCTIVITY OF POLYSTYRENE/POLYANILINE COMPOSITE

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ABSTRACT

Conducting powder of polystyrene/polyaniline was prepared by chemical polymerization of aniline using oxalic acid as a dopant and ammonium persulfate as an oxidizer in presence of recycled polystyrene. The electrical properties of polystyrene/polyaniline composite are investigated using the dielectric relaxation spectroscopy. The frequency dependence of AC conductivity obeys the Jonscher's universal power law for PS/PANI. The temperature dependence of the conductivity is found to obey an Arrhenius law with activation energy of 0.14 eV which supports that conduction occurs because of electronic hopping conduction mechanism. The measurements showed that Polyaniline has a conductivity of 10^-5 S/cm, while polystyrene/polyaniline exhibits nearly10^-6 S/cm. The Ac conductivity of the composites shows a dependence temperature at the range of 173.5-373.5K at 10 KHz. It is noted the AC conductivity has a Gaussian shape versus temperature centered around 293.5K. The observed increase in conductivity with temperature is a property of semiconductor but the decreasing conductivity above 293.5K could be due to the presence of absorbed water and its removal may have caused structural changes in the hygroscopic PANI polymer chains.

Keywords: *Polyaniline, polystyrene, conductivity, composites.*

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EFFECT OF NANO-SILICA ON SATURATION POINT OF SUPERPLASTICIZATION OF SULPHATE-RESISTANT CEMENT PASTE

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ABSTRACT

The addition of nano-silica (nS) by substitution in cement paste demands a higher percentage of superplasticiser to retain the optimum amount of water for the required viscosity. In this work, nS was used as an additive in the sulphate-resistant cement (CRS) paste with different amounts: 0.5, 0.8 and 1.1 wt% (0nS, 0,5nS, 0.8nS and 1.1nS) and the water/cement report was kept fixed (E/C = 0.35). All the rheological measurements were carried out using an imposed stress rheometer (AR 2000) at a temperature kept constant at 20 ° C. The saturation points of superplasticizer at each amount of nS are determined in paste by rheological tests. It was proved that nS increases the viscosity and yield value of cement paste and that can be diminished through adjusting the superplasticizer by maintaining the optimum quantity of water. The saturation points in superplasticizer of the cement paste without nS is 1.3 g and are 1.5, 1.8, 1.3 g with consecutively 0.5, 0.8, 1.1wt% in nS.

Keywords: *cement paste, nano, silice, superplasticizer, saturation point*

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SYNTHESIS, STRUCTURALL/TEXTURAL CHARACTERISATION, AND ADSORPTION PROPERTIES OF PANI-POUZZOLANE NANOCOMPOSITES

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ABSTRACT

The present work focuses on the synthesis of polyaniline-pouzzolane nanocomposites by in situ polymerization of aniline. Algerian Pozzolan (PZB) material from Beni-Saf-Ain-Témouchent was used as loading matrix. The prepared nanocomposite denoted as Pani-PZB were tested for the malachite green dye adsorption. The structural/textural features of the obtained composites were investigated through X-ray diffraction, argon adsorption-desorption, thermogravimetric analysis, and Fourier transform infrared spectroscopy. The results confirmed the formation of more thermally stable nanocomposites, with interesting structural and textural properties, when compared with the started polyaniline. Furthermore, the obtained results showed improving of green malachite dye adsorption capacity on the Pani-PZB mainly after pozzolan loading.

Keywords: *nanocomposite, Pozzolan, Pani, Polymerisation, green malachite, adsorption.*

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SYNTHESE DES HYDROGELS ANTIOXYDANTS A BASE DE XANTHANE

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ABSTRACT

Le greffage représente une méthode de modification qui permet d'améliorer les propriétés des polymères naturels ou synthétiques. La technique de polymérisation par greffage classique nécessite, en effet, l'introduction de groupes chimiques pour conférer de nouvelles caractéristiques aux polymères modifiés. Cette étude a pour objectif la formulation des hydrogels antioxydants sensibles Ã la variation de pH (hydrogels intelligents), à base de xanthane et l'acide polyacrylique en milieu hétérogène et en utilisant N-hydroxysuccinimide (NHS) et N,N'-Dicyclohexylcarbodiimide (DCC) comme des agents de modification. Cinq hydrogels ont été obtenus en variant la quantité de l'acide polyacrylique dans le mélange réactionnel. La caractérisation par spectroscopie Infrarouge à transformée de Fourier (FTIR) des hydrogels formulés montre l'apparition d'un pic compris entre 1720 et 1730cm-1 indiquant la formation d'une liaison ester. Les systÈmes obtenus présentent des degrés d'estérification (DE) compris entre 0.43 et 0.96, et possèdent un caractère antioxydant avec des taux d'inhibition des rédicaux hydroxyles libres variés entre 45 et 85%. L'étude de la cinétique de gonflement et d'érosion des hydrogels formulés montre que la modification chimique dans notre cas n'a pas apporté une diminution dans le taux de gonflement et d'érosion par rapport à celui du xanthane native.

Keywords: *modification, hydrogel, gonflement, antioxydant, xanthane. â€Ž*

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FILM THICKNESS EFFECT ON STRUCTURE AND OPTICAL PROPERTIES OF NANOSTRUCTURED ZNS THIN FILMS DEPOSITED BY SPRAY TECHNIQUE

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ABSTRACT

In this work, the sprayed ZnS thin films were deposited on glass substrate at 400°C using ultrasonic spray chemical technique (SPC). The effect of film thickness on structure and optical properties of nanostructured ZnS thin filmswas investigated. From XRD analysis, it was observed that the prepared material has a hexagonal structure with good crystallinity. This finding was in a good agreement with the morphological propertiesin the SEM images. It was also found that the maximum crystallite size is 45.3nm, which was obtainedwith577 nm film thickness. From optically experiments, ZnS thin films have a good transparency in visible region and the band gap energy of all deposit films was varied in the range 3.9-4.1eV.

Keywords: *film thickness, thin films, ZnS, ultrasonic spray method.*

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SYNTHESIS OF CARBON NANOSPHERES BY PYROLYSIS OF ALGERIAN NATURAL GAS CONDENSATE

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ABSTRACT

Algerian natural gas condensate as a new source of carbon is used to prepare the carbon nanospheres (CNSs) by pyrolysis method. A mixture of gas natural condensate and iron chloride as catalyst was injected into the reaction furnace to produce CNSs in an inert atmosphere (N2) at 1173 K, followed by multi step purification to remove different impurities. The carbon nanospheres have been characterized by scanning electron microscopy (SEM), energy dispersive X-rays spectroscopy (EDAX), X-ray diffraction(XRD), Raman spectroscopy and FTIRspectrum.
As results, the SEM image reveals that these CNSs have smooth surfaces and uniform particles with a diameter lower than 500 nm. the XRD and Raman studies shows that the graphitization degree of CNSs is not high , while the EDAX analysis shows that more than 95 % of the CNSs is carbon, FTIR proved the presence of new functions after samples treatment such as acid function.

Keywords: *carbon nanospheres, pyrolysis, natural gas condensate, scanning electron microscopy*

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FREE VIBRATION OF FUNCTIONALLY GRADED NANOSCALE PLATES RESTING ON ELASTIC FOUNDATION

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ABSTRACT

In this paper, a nonlocal shear deformation theory is presented for free vibration of functionally graded (FG) nanoscale plates resting on elastic foundation using the nonlocal differential constitutive relations. By dividing the transverse displacement into bending and shear parts, the number of unknowns and governing equations for the present theory is reduced, significantly facilitating engineering analysis. Indeed, the number of unknown functions involved in the present theory is only four, as opposed to five or even greater numbers in the case of other shear and normal deformation theories. The model takes into account the influences of the nonlocal parameter and the shear deformation effect across the thickness of the nanoscale plate and thus, it avoids the employ of shear correction factors. Also, in this present theory, the effect of transverse shear deformation is included in the axial displacements. The material properties are supposed to be graded only in the thickness direction and the effective properties for the FG nanoscale plate are calculated by considering Mori-Tanaka homogenization scheme. The equations of motion are obtained using the Hamilton's principle. Numerical results for vibration of FG nanoscale plates resting on elastic foundations are presented and compared with the existing solutions. The influences of gradient index, Winkler modulus parameter and Pasternak shear modulus parameter on the vibration responses of the FG nanoscale plates are investigated.

Keywords: *free vibration, plates, nanoscale, nonlocal shear deformation, functionally graded materials*

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SYNTHESIS AND MICROCHARACTERIZATION OF NIO AND ZN - DOPED NIO THIN FILMS PRAPARED BY SPRAY PYROLYSIS.

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ABSTRACT

Transparent conductor nanostructured nickel oxide Pure (NiO) and Zn -doped NiO thin films were prepared using a simple method spray pyrolysis technique from Nickel nitrate salt solution (Ni(NO3)2·6H2O) and (Zn(NO3)2·6H2O) on a glass substrate at a temperature of 350°C ± 10°C. During the deposition, the precursor concentration and Ni-doping content were maintained constant at 0.1 M. The structural of NiO films were investigated using X-ray diffraction (XRD).The results have shown that the films are polycrystalline structure type cubic phase and revealed a high orientation peak at 2θ =50°.

Keywords: *thin fiim, spray pyrolysis, NiO, NiO:Zn, polycrystalline*

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NEW TRANSPARENT ELECTRODES BASED ON AG NANOWIRES PREPARED BY SPRAY PYROLYSIS FOR PHOTOVOLTAIC APPLICATION

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ABSTRACT

A solution-processed, highly transparent, conductive electrode based on SnO2 and spray-deposited silver nanowires (Ag NWs) is developed as an effective top contact for solar cells, the surface coverage, thickness, and absorbance properties of the silver nanowire films were controlled by the number of layers deposited and after deposition the effects of the annealing temperature at room conditions were investigated. Films were characterized using scanning electron microscopy (SEM) (illustrated in Figure 1), Atomic Force Microscope (AFM), Hall Effect measurements and UV/vis absorption spectroscopy. Optical transmittance was influenced by the annealing temperature, the films showed an average transmittance between 65,4 to 82,7% by varying annealing temperature from 150 to 300°C the highest transmittance average value in visible spectrum was achieved for 180°C with good electrical conduction properties where the sheet resistance was 18 Ω /square. The role of the first deposited SnO_2 layer is o ensure good adhesion and distribution of Ag NWs on the substrate surface. Scanning electron and atomic force microscopy were used to study the morphology of SPD thin films which was affected by annealing temperature. Such electrodes can contribute in fabrication of cost-effective tandem solar cells.

Keywords: *Vis spectroscopy., Uv, Ag Nanowires, transparency, SnO2, Thin films*

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ANNEALING TEMPERATURE EFFECT ON STRUCTURAL, OPTICAL AND PHOTOCATALYTIC PROPERTIES OF ZNO AND (NI, CU, FE)-DOPED-ZNO THIN FILMS PREPARED BY SPRAY PYROLYSIS

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ABSTRACT

ZnO and ZnO-doped (Ni, Cu, Fe) thin films have been deposited on glass substrates at temperature of 450 °C by ultrasonic spray pyrolysis technique. Their structural, optical and photocatalytic properties are studied. X-ray diffraction show that all the films are polycrystalline with hexagonal wÃ¼rtzite type, and a (101) preferential direction. Transmittance spectra show that the obtained films are transparent in the visible region The grains size of all the films increase after the annealing, the band-gap energy, the Urbach parameter, the films thickness decrease after the annealing, while the refractive index don't change. These results indicate that the films are better organized when they were annealed. The application in Photocatalysis shows that the best performance for the degradation of methyl green is obtained for ZnO films.

Keywords: *Annealing temperature, ZnO, Thin film, Spray pyrolysis, Photocatalysis*

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BUCKLING ANALYSIS OF RECTANGULAR FUNCTIONALLY GRADED PLATES USING FIRST-ORDER SHEAR DEFORMATION THEORY MODEL

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ABSTRACT

In this paper, the buckling response of Functionally Graded (FG) isotropic plate, subjected to uni-axial and bi-axial compression loads, has been studied, using a four-nodded rectangular finite element based on the First-order Shear Deformation Theory (FSDT). Simply supported plate made of aluminum and alumina has been considered. The material properties of the plate have been assumed to vary continuously through the thickness according to a power-law distribution in terms of the volume fractions of the constituents. The total potential energy principle has been applied to formulate stiffness and geometric matrices. Assumed natural strain method has been introduced to avoid potential shear locking phenomenon. The accuracy of the present formulation has been verified by comparing the obtained results with the known results in the literature. The influences played by many parameters have been investigated.

Keywords: *Finite element, FSDT, Functionally Graded plates, Buckling, power, law distribution.*

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ANNEALING TEMPERATURE DEPENDENCE OF STRUCTURAL AND OPTICAL CHARACTERIZATION OF SILICON NANOCRYSTALS EMBEDDED IN SILICON-RICH SIN0.38 FILM

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ABSTRACT

Silicon nitride films (SiNx <1.33) rich in silicon obtained by plasma-enhanced chemical vapor deposition (PECVD), films of SiNx with various excess silicon were deposited by adjusting the flow of SiH4 and NH3 and then carrying out an annealing treatment in the oven at 800° C, 900, 1100 and 1150° C for 1 hour. The effects of the annealing temperature on Si-NCs optical properties incorporated in silicon-rich SiNx (x=0.38) were studied by photoluminescence (PL) and the structural properties were carried out by X-ray diffraction and by Raman spectrometry, as well as by electronic scanning microscopy. The diffraction peaks of the (111), (220) and (311) planes of Si are observed from the annealing temperature of 1100° C, the full width at half maximum (FWHM) of the main peak C-Si (111) decreases with increasing temperature indicate good crystalline quality and nanoscale crystallite size.A Raman spectrum of SiN0.38 annealed at 800° C shows a broad band centered around 484cm -1, which is related to the transverse optical band (TO) of amorphous Si, the peak intensity of a-Si significantly decreases at 1100° C, suggesting the decrease of the amorphous Si content and the transformation of Si QDs from the amorphous state to the crystalline state. Typical deconvolution of the sample by Raman spectrum indicates a high crystalline volume fraction at this temperature; this result was confirmed by scanning electron microscopy (SEM)

Keywords: *X, Temperature annealing, Ncs), Si nanocrystals (Si, Si rich SiNx, ray diffraction*

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L'EFFET DES PROPRIETES DE L'ADHESIF SUR L'EFFICACITE ET LA DURABILITE D'UNE PLAQUE FISSUREE ET REPAREE PAR PATCH EN COMPOSITE

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ABSTRACT

L'objectif principal de cette étude est d'analyser par la méthode des éléments finis la distribution des contraintes de cisaillement et de pelage ainsi que du facteur d'intensité de contrainte FIC dans une structure réparée par patch en composite. L'effet de certains paramètres, tels que l'épaisseur et le module de cisaillement de l'adhésif sur l'évolution du facteur d'intensité de contrainte et la distribution des contraintes tangentielles et de pelage dans l'adhésif a été pris en considération. Le facteur d'intensité de contraintes en tête de fissures réparées sera calculé pour comparer l'efficacité de la technique de réparation, La distribution des contraintes dans la couche adhésive sera analysée pour comparer la durabilité de cette technique. Les résultats ont montré clairement que l'utilisation du patch a pour conséquence de rigidifier la structure et de retarder la propagation de la fissure. Cette rigidité dépend des paramètres géométriques et mécaniques de l'adhésif, donc l'épaisseur de l'adhésif doit être optimisée car une faible épaisseur peut engendrer l'augmentation des niveaux des contraintes de cisaillements qui à leur tour provoque la rupture de l'adhésion contrairement a une colle épaisse engendre une bonne réparation en pointe de fissure. Une optimisation du module de cisaillement de l'adhésif est recommandée, il est donc préférable d'utiliser des adhésifs à fort module de cisaillement pour la réparation de fissures ou de défauts.

Keywords: *Patch en composite, Réparation, Fissure, Facteur d'intensité de contrainte, Méthode des éléments finis.*

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STUDY OF THE MECHANICAL ALLOYING EFFECT ON THE STRUCTURAL AND MICROSTRUCTURAL PROPERTIES OF FE-15P POWDERS.

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ABSTRACT

Nanostructured powders Fe-15P (mass.%) were prepared by high energy ball milling in a Fritsch P7 planetary ball mill for 3, 6, 12 and 24 h. The characterization of the milled powders was carried out by X-ray diffraction. The structural study using the Rietveld refinement of the X-ray diffractograms revealed the formation of a solid solution α-Fe (P) with two structures (a- Fe1 and a-Fe2) in which are added various phosphides (FeP, Fe2P, Fe3P and FeP2). The microstructural study with an anisotropic model of grain size and microstrains field has demonstrated the stability of the a-Fe 2 phase with very little deformed grains and stable average sizes compared to a-Fe1 which registers a high energy of storage and a density of dislocations after 12 h of milling. The evolution of the mechanical properties "Young's Modulus and Poisson's Coefficient" reveals the stiffness and high deformation properties of the α-Fe1, α-Fe2 and Fe2P phases formed at 12 and 24 h of milling.

Keywords: *High energy ball milling, P alloys, Fe, Nanomaterials, X, ray diffraction, Rietveld method.*

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ELABORATION AND CHARACTERIZATION OF ZINC OXIDE/ POROUS SILICON STRUCTURE FOR NH3 SENSOR APPLICATION AT ROOM TEMPERATURE

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ABSTRACT

In the present work, we report the elaboration of zinc oxide (ZnO) / Porous silicon (PS) structure for NH3 gas sensor working at room temperature. The ZnO thin films were deposited on porous silicon substrate by electrochemical technique. The ZnO / PS structure were characterized by scanning electron microscopy (SEM) and X-ray diffraction (XRD). The gas sensing properties of ZnO / PS structure was examined at room temperature for low concentrations of NH3. Current-voltage (I-V) characteristics show that the sensor properties were modified in the presence of NH3. In addition, the structure exhibits fast response and recovery times less than 38 and 32s, respectively.

Keywords: *Porous silicon, Thin films, ZnO oxide, Gas sensing, NH3.*

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EFFECT ON STUCTURAL AND MAGNETIC PROPERTIES OF ZINC DOPED IRON OXIDE NANOPARTICLES

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ABSTRACT

This study deals the elaboration and effect on structure, magnetic properties of zinc doped hematite nanoparticles. The samples were prepared by the sol-gel method, then characterized by different means such as characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray analysis (EDX) and magnetic measurements (VSM). The X- ray diffraction analysis confirmed the formation of α-Fe2O3 phase with the apparition of ZnFe2O4 as a secondary spinel ferrite phase. We have also observed that the grain size decreases with increases in Zn amount. The SEM micrographs show that the grains are very dense and well-connected.Magnetic measurements of all the samples showed a ferromagnetic behavior. Saturation magnetization was increased gradually while coercivity decreased from 1087.12 Oe to 238.73 Oe with the increasing of the concentration zinc.

Keywords: *VSM, nanoparticles, ZnFe2O4, Sol Gel, Hematite, Doping*

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THE EFFECT OF OXYGEN VACANCIES ON THE ELECTRONIC AND OPTICAL PROPERTIES OF UNDOPED AND LA-DOPED ZNO NANOWIRES; A DFT+U STUDY

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ABSTRACT

In this work, the DFT+U method was applied to study the effect of oxygen vacancies on the electronic and optical properties of both undoped and La-doped ZnO. The obtained results show that the presence of this kind of defects may greatly affect the electronic and optical properties of La-doped ZnO nanowires. We find that the formation of La-Vo complex may induces electronic levels in the gap of ZnO NW's and it will enhance the Vis absorption of this materials. This defect affects also the work function of ZnO nanowires. formation energy of all possible configurations as well as pdos analysis were done to deeply understand the properties of this defect.

Keywords: *DFT+U, nanowire, ZnO*

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POSSIBLE P-TYPE DOPING WITH A SODIUM ATOM:E THEORETICAL STUDY

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ABSTRACT

The present work is a theoretical study of a most element Na that attracted much interest of the research community for p-type realisation effect on electronic and optical properties of zinc oxide (ZnO) wurtzite structure, using the density functional theory (DFT) which is developed to calculate the electronic states of solids containing huge numbers of electrons1. The band structure and Density of States (DOS) diagrams are plotted from the optimized equilibrium lattice parameters, an effective of Na approach is describe to modify the electronic properties of ZnO with a 55 electrons near the Fermi level, moreover we could observed a high loss energy along the range (10nm-50nm) the strong peaks near 270nm for ZnO and ~830nm for ZnO Na are mainly caused by the bulk phonon excitation in very low energy near 120nm may be due to multiple inter-band transitions2, while other ZnO doping locate at the low energy region. Additionally, the presence of impurity of Na significantly decrease the transmittance of ZnO which is expected to provide new applications of industrial optoelectronic and photovoltaic.Our calculations provide reasonable interpretation for the experimental findings.

Keywords: *Band Structure, Castep code, DFT Theory, ZnO, :Wurtzite, Loss Function*

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ETUDE DE DÉPÔT DE COUCHES MINCES DE NANOCOMPOSITE SIC-SIO2 PAR PULVÉRISATION CATHODIQUE

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ABSTRACT

Le but de ce travail est d'étudier l'influence du temps de dépôt sur la morphologie, les propriétés structurales et optiques des nanocomposites de SiC-SiO2 élaborées par pulvérisation cathodique RF magnétron 13.56 MHz. Les dépôts sont réalisés en utilisant une cible de SiO2 et deux brins de polycristallin 6H-SiC. Les temps de dépôts utilisés dans cette étude sont 30 min et 1h. Les techniques de caractérisation utilisées dans cette étude sont : la microscopie électronique à balayage (MEB), la diffraction des rayons X (DRX), la spectrophotométrie UV-VIS et la spectrométrie de masse des ions secondaires SIMS. Les photo MEB ont révélé que le matériau présente une forme granulaire avec un diamètre de taille de grain moyen évalué à environ 100 nm et un film mince régulier dans les deux temps de dépôt, quand à la réflectance, nous avons obtenu une réflectance de 12.11% pour le dépôt de 30 min tandis qu'elle est de 22.71% pour le dépôt d'1 h, concernant le substrat sans dépôt , la valeur de la réflectance atteint les 34%, de là, on déduit que la mesure de la réflectance montre bien le dépôt de couche mince de matériau composite SiC-SiO2 diminue considérablement la réflectivité, enfin Le profil SIMS a enregistré la présence d'oxygène à la surface, signal situé sous le signal de silicium et le signal de carbone, ce qui confirme que l'oxyde (SiO2) est le premier matériau déposé sur le film d'interface - substrat à structure a-OSiC..

Keywords: *couches minces, oxide de silicium, carbure de silicium, caratérisation*

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OPTICAL AND STRUCTURAL PROPERTIES OF ZNO-AL THIN FILMS BY SPIN COATING

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ABSTRACT

Undoped and aluminum-doped ZnO thin films are prepared by the sol-gel process. Zinc acetate dihydrate, aluminum nitrate nonahydrate, ethanol and mono ethanolamine were employed as precursor, dopant, solvent and stabilizer, the multi thin layers are prepared by spin-coating on ultrasonically cleaned glass substrates, respectively. X-ray diffraction, UV-VIS, photoluminescence techniques were investigated for the characterization of the prepared AZO thin films. X-ray diffraction study show that all the films prepared in this work have hexagonal wurtzite structure, with a relative preferential orientation along the c-axis and the lattice parameters a = b = 3.260 Ã…, c = 5.214 Ã…. UV-VIS spectroscopy showed that the average value of the films transmittance in the visible region is found to be around 85 % and the gap ranges in the interval [3.15 eV-3.30 eV]. The photoluminescence spectrum only showed the UV peak while the broad band of the visible region was completely vanished.

Keywords: *ZnO, XRD, Spin coating, Photoluminescence*

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SYNTHESIS AND CHARACTERIZATION OF NANO-STRUCTURED ZN DOPED NIO THIN FILMS AND THEIR UV PHOTODETECTION PROPERTIES

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ABSTRACT

In this study, undoped and zinc doped NiO thin films were prepared by a cost-effective spray nebulizer technique at different percentages (0-6%) of Zn2+ion. The influence of Zn incorporation on structural, optical, electrical and UV photodetection properties of NiO films were studied. The prepared samples have been analyzed using X-Ray diffractometer (XRD), ultraviolet visible (UV-VIS) spectroscopy, and two-probe I-V measurement system for structural investigations, defects measurements, optical, electrical properties and UV photodetection respectively. X-ray diffraction patterns revealed that all the films exhibit cubic bunsenite nano-structured phase with preferred orientation along (111) axis, and the NiO films crystallinity improved on Zn doping concentration. Optical results indicate an improved transmittance above 80 % in the visible region for all the Zn-doped NiO thin films. Moreover, the estimated band gap energy decreased tuning from 3.73 to 3.48 eV as Zn content increases. The electrical measurements showed linear I-V characteristics with different resistivity values. The UV photodetection characteristics of prepared films were further studied at room temperature and showed good sensitivity towards UV light greatly and influenced with Zn content.

Keywords: *UV photodetection., XRD, doped NiO thin, Zn, spray nebulizer*

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EFFECT OF ZN DOPING ON THE OPTICAL PROPERTIES OF SNO2 THIN FILMS DEPOSITED BY SOL-GEL DIP-COATING

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ABSTRACT

In this study, the influence of Zn doping concentration on phase stability, surface topography and optical properties of SnO2 thin films is investigated. Pure and Zn-doped SnO2 thin films have been prepared by sol-gel dip-coating deposition method onto glass substrates. The molar ratio of [Sn] / [Zn] varies in the range 0.0 - 1.0. The deposited films have been dried at 400°C for 10 min and finally annealed at 500°C in air for 1 hour. The films have been analyzed by X-ray diffraction (XRD), atomic force microscopy (AFM) and UV-VIS spectroscopy. XRD analysis confirmed the formation of pure nanocrystalline tetragonal SnO2 phase. AFM images reveal homogeneous surfaces for all films while the surface morphology changes with Zn concentration; the roughness increases reaching an optimum value around 14 nm for 0.4 Zn then decreases upon higher loading. Optical measurements indicate that both pure and Zn-doped SnO2 thin films are transparent (89-97%) with a good transmission in the near UV-Vis, meanwhile the value of energy band gap varies within the narrow range of 3.81 - 3.92 eV.

Keywords: *XRD, coating, gel dip, Sol, Zn doped SnO2, Thin films, UV, Visible, AFM.*

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STRUCTURAL AND OPTICAL ANALYSIS OF SNO2 THIN FILMS

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ABSTRACT

SnO_2 thin films were deposited by an Ultrasound pyrolysis spray technique at 450°C. The films were caracterized by X-ray diffraction, Fourier transformed infrared (FTIR), ultraviolet-visible and Photoluminescence spectroscopy. The tétragonal rutile-type structure was confirmed by X-ray diffraction with an average crystallite size of 35 nm. The FTIR study indicated the existence of two distinct characteristic absorption, the first peak obtained at 574Cm-1 corresponding to mode of vibration of (0-Sn-O) deformations and the second at 665 Cm-1 corresponding to (O-Sn) stretching. For the optical properties, the band gap energy was determined by Wemple-DiDomenico model. PL properties are ascribed to the presence of intrinsic défects.

Keywords: *ray diffraction, X, SnO_2, Optical properties.*

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TIO_2 NANO-FILMS MORPHOLOGY

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ABSTRACT

In this paper, TiO2 nano-films were deposited by RF magnetron sputtering using a TiO2 ceramic target of pure Ti of 3" diameter and 0.250" thickness with a purity of 99.99%, onto heated glass substrates for two temperature 300 and 450°C. This work focusses on the morphology study of TiO2 nano-films. For this, we used Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectrometry (EDS Or EDX) for characterization of the produced films. 2D and 3D AFM images of TiO2 thin films for the temperature 300°C and 450°C show a surface full of relief; these reliefs are uniformly distributed on the surface. The root means square roughness results are 1.031 and 1.53 nm for TiO2 films deposited at 450°C and 300°C, respectively. We observed a smoothest surface for T=450°C. The same remark can be observed on SEM images. It is found that the increase of the surface roughness with the annealing time is strongly correlated with an increase in the grain size of the nanoparticles. Otherwise, the EDS results analysis for temperatures 300 °C and 450 °C, confirms the presence of two elements: titanium "Ti" and oxygen "O" with a material content of 34.88 and 65.12% for T = 300 °C, respectively, and, 40.02 and 59.98 % for T = 450 °C, respectively. Indeed, these results imply the formation of TiO2. In conclusion, we can deduce that the AFM images show that a low value of roughness surface was found at a high temperature, which is good for corrosion resistance enhancement. Indeed, nano-films morphology can be optimized by varying deposition temperature.

Keywords: *AFM, magnetron sputtering, TiO_2 nanofilms, Semiconductor, SEM, EDS.*

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STRUCTURAL EFFECT OF ADDITIVE ON THE SOLID-STATE REACTION IN BRASS POWDERS DURING MECHANICAL ALLOYING

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ABSTRACT

Solid state reactions involve the formation of phases at the reagent interfaces. The growth of the produced phase requires the diffusion of the atoms of the reagents through the same phase. Thus, reactions in the presence of new phases require higher temperatures to occur at a reasonable rate. The solid state reactions in the studied alloys were induced by high energy ball milling of brass powders doped with iron during different milling times. The obtained powders were investigated by X-ray diffraction. The effect of structural disorder is evidenced by the presence of a several overlapping peaks and spread over the milling time range [2-4] h. The result of the Rietveld refinement of the XRD pattern, using an isotropic model with Maud program, indicates that during the milling of the powders up to 4 h, several phases are detected: Fe4Zn9, Fe0.7Zn0.3, Cu5Zn8, Cu0.255 Zn0.745, Cu0.8Fe0.2, Cu0.003Fe0.997 and Î±-Fe. The highest proportions were obtained for the Fe-Zn phases after 4 h of milling. The microsturctural study reveals the formation of nanoscale grains (>100 nm) for all the present phases but bigger one's for iron phase (350 nm). To understand the solid state reactions path, the evolutions of the mechanical parameters, reveals a high Young's and Poisson's modulus and storage energy with a variable and unstable crystalline parameter that causes deformation of the shape of grains.

Keywords: *MAUD, Rietveld, DRX, Brass, Isotropic model.*

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SMART DRUG DELIVERY SYSTEMS FOR IMPROVED SOLUBILITY OF VALSARTAN

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ABSTRACT

Enhancement of the solubility and bioavailability of poorly soluble drugs is a major challenge for formulation scientist. To overcome these drawbacks, controlled drugs delivery systems have been of great interest for the past few decades to realize the effective and targeted delivery of these drugs and to reduce their side effects. In this study, we have synthesized alginate microbeads loaded with valsartan for prolonged release of this drug in effective and safe management of cardiovascular diseases. The microbeads were prepared by employing ionotropic gelation technique. The development of specific interactions between the drug and the polysaccharide biopolymer was investigated by thermogravimetric analysis (TGA), powder X-ray diffraction (XRD) and Fourier transform infrared (FTIR) spectroscopy. Determination of the microbeads size was performed by optical microscopy and an averaged value was reported. In a second time and for comparative purposes, calcium alginate nanoparticles as carriers in drug delivery systems were also synthesized by controlled gellification. The alginate nanoparticles were characterized by XRD, TGA and FTIR spectroscopy. The analyzes provided information about the morphology, structure, thermal stability and composition of the nanoparticles. In vitro release studies were performed in two environments: simulated gastric and intestinal fluids. The results confirmed a prolonged drug delivery system profile.

Keywords: *Delivery., Nanoparticles, Solubility, Valsartan*

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DFT STUDY OF HYDROGEN AD-ATOM ON GRAPHITIC 2D SYSTEMS: GERMANENE AND SILICENE

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ABSTRACT

A multi-scale atomistic study based on the pseudopotential Density Functional Theory (DFT) to study the adsorption of hydrogen ad-atom on graphitic 2D systems is presented. The selected 2D-Systems are the germanene and silicene which are very similar to graphene. But in contrast to the planar graphene lattice, the silicene and the germanene honeycomb lattice are buckled and composed of two vertically displaced sub-lattices. The standard DFT calculations do not describe adequately the nonlocal interactions (London dispersion). For this reason, the semi-empirical Dispersive Force correction (DF) is added to the standard DFT functional. The structural properties and energetic diagrams of the selected systems are determined and discussed. The obtained results are also compared with the graphene system.

Keywords: *density functional theory, Hydrogen adsorption, 2D, system*

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OPTICAL AND STRUCTURAL PROPERTIES OF ZNO-AL THIN FILMS BY SPIN COATING

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ABSTRACT

Undoped and aluminum-doped ZnO thin films are prepared by the sol-gel process. Zinc acetate dihydrate, aluminum nitrate nonahydrate, ethanol and mono ethanolamine were employed as precursor, dopant, solvent and stabilizer. In the present work 0.3M Zinc acetate dihydrate was taken as the precursor solution. The mono ethanolamine (MEA) was used as the stabilizer having molar ratio of MEA to Zinc acetate as 1.0. The resulting solution was stirred at 60Â°C for 2 hours to yield a clear and homogeneous sol-gel, which served as the coating solution after cooling to room temperature. The multi thin layers are prepared by spin-coating on ultrasonically cleaned glass substrates, respectively. X-ray diffraction, UV-VIS, photoluminescence techniques were investigated for the characterization of the prepared AZO thin films. X-ray diffraction study show that all the films prepared in this work have hexagonal wurtzite structure, with a relative preferential orientation along the c-axis and the lattice parameters a = b = 3.260 Ã…, c = 5.214 Ã…. UV-VIS spectroscopy showed that the average value of the films transmittance in the visible region is found to be around 85 % and the gap ranges in the interval [3.15 eV-3.30 eV]. The photoluminescence spectrum only showed the UV peak while the broad band of the visible region was completely vanished.

Keywords: *Spin coating, XRD, ZnO, Photoluminescence*

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RIETVELD FITTING METHOD FOR THE COMBINED SISE-STRAIN-STESS DETERMINATION IN IRON COBALT PHOSPHIDES DIFFRACTION

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ABSTRACT

Ternary metal phosphides FeCoP are synthesized using mechanical alloying in a high energy planetary ball mill using elementary powders of iron, Fe, cobalt, Co, and red phosphorus, P, wich allows the formation of alloys with a grain size in the nanometer range. The powders was obtained after different milling times at room temperature and studied by X-rays diffraction. The Rietveld refinement allows the overall profile of the experimental diffraction pattern to be directly adjusted by using as variables the instrumental characteristics in addition to the structural and microstructural parameters of the sample. More precisely, the refinement program minimizes, by an algorithm based on the least squares method, the function called residue. This refinement using the Rietveld method is an efficient procedure for the analysis of X-ray diffraction patterns of Fe-Co-P nanostructured powders. As a result, during milling, structural and microstructural changes are revealed. The deviations of the crystals parameters of the nanocrystallines phases, namely the solid solution of iron, the FeP2, FeP4, FeP, CoP3, Co2P , CoP and CoFe, the refinement of the grain size and the increase of the average rate of micro-stresses exhibit significant distortion of the crystal lattices and the variation of the texture.

Keywords: *Reitveld refinement., Nanomaterials, ray diffraction, X, FeCoP alloy, Mechanical alloying*

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PHOTOCATALYTIC DEGRADATION OF MALACHITE GREEN BY CU2O-COATED SILICON NANOWIRE ARRAYS UNDER VISIBLE LIGHT IRRADIATION

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ABSTRACT

Silicon nanowires (SiNWs) were elaborated by one-step metal-assisted electroless chemical etching of silicon substrate in $HF/AgNO_3$ aqueous solution. SiNWs/Cu_2O nanoheterojunctions were prepared by electroless deposition of Cu_2O nanoparticles on the surface of SiNWs. The as-prepared samples were characterized by scanning electron microscopy and X-ray diffraction. In this work, we investigated the malachite green photodegradation by modified and unmodified silicon nanowires (SiNWs) under visible light irradiation. A degradation rate of about 50 % was achieved after 150 min irradiation. Such results demonstrate the potential use of SiNWs/Cu_2O nanoheterojunctions as a low cost and high performance material for photocatalysis.

Keywords: *Malachite green, Cu2O, Keywords: Silicon nanowire arrays, Photodegradation.*

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ZNO THIN FILMS GROWN BY PLASMA SPUTTERING PROCESS FOR OPTOELECTRONIC APPLICATIONS: EFFECT OF SUBSTRATE TYPE

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ABSTRACT

In the present work, we report on the preparation by the RF magnetron sputtering technique of zinc oxide (ZnO) thin ï¬ • lms with a deposition time of 50 min corresponding to 150 nm thickness on glass, quartz and silica-on-silicon (SiO2/Si) substrates. The effect of substrate type on the structural, morphological, optical and photoluminescence (PL) properties are investigated by X-ray diffraction (XRD), scanning electronic microscopy (SEM), atomic force microscopy (AFM), ultraviolet-visible (UV-Vis) and PL spectroscopies. XRD patterns show that all deposited films crystallized in a hexagonal Wurtzite structure with a preferential orientation along the (002) plane. Better crystalline quality and higher c-axis orientation are observed in the film deposited on SiO2/Si substrate. SEM and AFM images reveal that morphology, grain size and surface roughness of the films are influenced by the substrate type. The ZnO film deposited on quartz substrate shows a very smooth surface morphology with the smallest root-mean-square roughness (Rrms) value around 2.00 nm. According to UV-Vis measurements with respect to substrate, ZnO thin films deposited on quartz substrate are highly transparent with about more than 87% average optical transmissions in the visible region. However, a fall in the average transmission (84.5%) is observed for those prepared on glass substrate. Moreover, the calculated values of the optical band gap (Eg) are found to be 3.23 and 3.24 eV for the ZnO films deposited on glass and quartz substrates, respectively. Room temperature PL spectra of the ZnO films deposited on glass and quartz substrates exhibit a sharp and intense UV emission and two main weak bands centered at blue and red regions. However, the emission of the film prepared on SiO2/Si substrate is very weak consisting of UV and several visible bands.

Keywords: *optoelectronic., photoluminescence, RF sputtering, substrate type, ZnO thin films*

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STUDY OF VIBRATIONAL AND MECHANICAL PROPERTIES OF LIXO3 (X = NB, TA): APPLICATION TO SURFACE ACOUSTIC WAVE (SAW) DEVICES

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ABSTRACT

The vibrational and mechanical properties of LiXO3 (X= Nb, Ta) were investigated at zero pressure and 0 K by means of first-principles calculations using a combination of density functional theory (DFT) and density-functional perturbation theory (DFPT). Phonon dispersion, Vikers hardness HV, acoustic GrÃ¼neisen parameters Î³a, minimal thermal conductivity Kmin, longitudinal Vl and transverse Vt sound velocity, Debye temperature Î¸D and specific heat capacities CpÂ were numerically estimated and compared with the available experimental and theoretical data. In addition, the present study describes the computational modeling, simulation and optimization of surface acoustic wave (SAW) delay line based on LiXO3 (X= Nb, Ta) piezoelectric crystals. The frequency response, Radiation conductance and Acoustic susceptance of the SAW delay line were evaluated using COM model. These results indicates that both crystal are brittle, and LiTaO3 exhibits higher hardness, stiffness and suitable for low frequency applications than LiNbO3.

Keywords: *LiNbO3, delay line, surface acoustic wave (SAW), phonon spectrum, DFT*

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SIMULATION OF THE ELECTRICAL PARAMETERS OF ORGANIC PHOTOVOLTAIC CELLS

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ABSTRACT

This work represents the modelling and simulation of organic solar cells using Quite Universal Circuit Simulator, QUCS. An equivalent circuit model constituted from one diode, a series and shunt resistance, and a photocurrent generator have been used. The simulated results as function of different parameters such as series resistance, temperature of the cell, the ideality factor and current saturation are given. The current density as function of voltage J-V characteristics of the organic cell obtained from the experimental results are compared to the simulated one, a value of 1.2 of the ideality factor is established.

Keywords: *ideality factor, temperature effect, Organic solar cells, Simulation, QUCS.*

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SYNTHESIS OF HIERARCHICAL BETA NANOPARTICLES AND THEIR CATALYTIC PERFORMANCE IN M-XYLENE ISOMERIZATION AND DISPROPORTIONATION

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ABSTRACT

The purpose of our work is divided in two parts: the first part is a contribution to the study of nanostructured hierarchical materials presenting a potential mainly in the field of catalysis. The objective of our is the synthesis of hierarchical materials by two different methods: (1) Direct hydrothermal method (DHM) by assembling beta nanocrystals around the pluronic triblock copolymer (P123) in an acidic medium; (2) Acidification of the suspension of beta germs (without using the structuring agent). For both methods, the effect of the crystallization time of the precursor Beta nanoparticles (germs) was studied at different times: 6, 12 and 24 h. The materials obtained were characterized using nitrogen sorption, thermogravimetric analysis (TGA), X-ray diffraction (XRD), transmission electron microscopy (TEM), temperature programmed desorption ammonia (NH3-TPD) and pyridine adsorption / desorption controlled by FTIR. The second part concernsÂ m-xylene isomerization/disproportionation reaction in gas-phase which was carried out over all the synthesized solids in order to explore their catalytic properties. It was found that the m-xylene conversion and isomerization/disproportionation ratio were closely related to the crystallization time of Beta zeolite precursors, mesopores creation in hierarchical Beta zeolite nanoparticles and the method used to produce the extra meso-porosity.

Keywords: *m, mesoporous materials, Micro, Hierarchical Beta, Nanoparticles, Beta zeolite, xylene isomerization*

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DEVELOPMENT AND CHARACTERIZATION OF POLYACRYLAMIDE/XANTHAN GUM BLEND BIONANOCOMPOSITES

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ABSTRACT

These last decades, nanostructured systems based on polymer blends and nanofillers are attracting great interest of both academic and industrial scientists because of the possibility of combining inorganic and organic entities. The potential performance benefits of these materials make them as appropriate candidates for several applications in fields ranging from packaging to biomedical applications. In this study, polymer nanocomposites based on polyacrylamide/Xantan gum blends, and montmorillonite clay as reinforcing nanofiller have been successfully developed. The use of two clays, a sodium montmorillonite (MMT-Na) and an organophilic montmorillonite (OMMT) has been adopted. The success of the organomodification of the OMMT clay was highlighted by FTIR spectroscopy, X ray diffraction spectroscopy and thermogravimetric analysis (TGA). Fourier transform infrared spectroscopy was used to identify the nature of the interactions developed within the blend between the polyacrylamide (PAM) and Xanthan (Xan) chains as well as between each polymer and the clay. It was showed that these interactions were of Hydrogen bonding type. The effect of the insertion of the clay nanofiller on the interactions developed within the (nano)composites as well as on their thermal properties was studied by thermogravimetric analysis (ATG), differential scanning calorimetry (DSC) or differential thermal analysis (DTA). Thermogravimetric analysis revealed that clay improved the thermal stability of Xan/MMT-Na, Xan/PAM/MMT-Na et Xan/PAM/OMMT; however, the thermal stability of PAM/MMT-Na5 worsened.

Keywords: *xanthan gum., polyacrylamide, montmorillonite, nanoparticles, Polymer blends*

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ELASTIC, ACOUSTIC AND PIEZOELECTRIC PROPERTIES OF BA0.5SN0.5TIO3 AS NEW POTENTIAL LEAD-FREE FERROELECTRIC MATERIAL FOR ACOUSTIC WAVE DEVICES

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ABSTRACT

Lead-free ferroelectric perovskites such as SnTiO3 (SNTO) and BaTiO3 (BTO) have recently attracted enormous interest for use in development electronic devices such as actuators, accelerators, transducers, filters, resonators and acoustic sensors. We report a first study on elastic, mechanical, acoustic and piezoelectric properties of the new lead-free ferroelectric Ba0.5Sn0.5TiO3 (BSNTO) using highly accurate full-potential linearized augmented plane wave (FP-LAPW) method within PBEsol potential in the frame of density functional theory (DFT). The elastic constants Cij and other relevant quantities, such as the bulk modulus (B), shear modulus (G), Young's modulus (Y), anisotropy factor, Poisson's ratio (n), Debye temperature (QD), milting temperature (TM), longitudinal (ul), transverse (ut) and average (um) sound velocities were determined for the studied compound. The obtained results are in excellent agreement with the experimental data. The results showed high values of Cij, B, G and Y indicate that this compound is stiff, hard and more rigid. The obtained elastic constants Cij show that Ba0.5Sn0.5TiO3 is dynamically and mechanically stable in a tetragonal perovskite phase. The calculated Poisson's ratio (» 0.24) indicates that this crystal has strong ionic bonds character. Acoustic wave velocities, QD and TM quantities are much larger than those of other classic materials such as PbTiO3, SnTiO3, LNO, and KNO. The piezoelectric coefficients (dij) and static dielectric constants (єij) were also presented and analyzed via VASP computer code. We find that the piezoelectricity is enhanced for Ba0.5Sn0.5TiO3 compared to those of SnTiO3 and PbTiO3 ceramics. Ba0.5Sn0.5TiO3 appears as a promising lead-free piezoelectric material to develop high-performance electronics as acoustic sensor devices.

Keywords: *DFT theory, acoustic devices, piezoelectricity, Elastic properties, Ba0.5Sn0.5TiO3.*

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THE CRITICAL BUCKLING LOAD OF A POLYMER PLATE REINFORCED WITH CARBON NANOTUBES

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ABSTRACT

The incorporation of carbon nanotubes in a polymer matrix makes it possible to obtain nano-composite materials with exceptional properties and it is in this scientific context that this work has been based. There are several theories that deal with the behavior of plaques, in this research we have based on the theory of Mindlin-Reissner, which takes into account the transverse shear effect, to analyze the critical buckling load of a carbon nanotube reinforced polymer plate.The purpose of this analysis is to examine the static problems of CNT-reinforced polymer plates using Reissner-Mindlin shear theory. NTC reinforced plates simply supported are taken into account and the influences of various parameters on the flambent are presented and discussed. The numerical results are compared with those given in the literature This article studies the influence of different parameters on the critical buckling load of polymer plates reinforced by carbon nanotubes. Through the results obtained, for the analysis of the critical load of flambent, we find that the type of plate X is more rigid compared to other types of CNTRC.

Keywords: *volume fractions, composite, nano, buckling, Reissner, Mindlin*

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PHYSICOCHEMICAL STUDY OF INTERACTIONS IN POLYMER BLEND BASED ON (DEXTRAN / POLYVINYLPYROLIDONE) FOR USE AS PHARMACEUTICAL BINDER.

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ABSTRACT

The development of industrial polymer blends with specified final properties for wet granulation is a major challenge in the pharmaceutical field. As part of this work, a particular interest has been focused on the study of specific interactions in blends polyvinylpyrrolidone / dextran, (PVP / Dex) in solution and in solid state by various analytical methods. The study in aqueous solution by viscosimetry revealed that the reduced viscosity as a function of blend composition showed a negative deviation from the arithmetic mean reflecting the development of specific interactions between the two polymers in solution. In solid state the compatibility of the blends was investigated by DSC, thermal gravimetric analysis (TGA) and FTIR spectroscopy. Complete or partial miscibility of the blends in different weight ratios has been ascertained by the observation of a single or two glass transition temperatures respectively. The TGA results indicated a slight increase in thermal stability by mixing suggesting the development of specific interactions within the system. The second part of this work aimed to investigate the miscibility effect of the blends by the comparison of flow properties and compressibility of a powder bed, granulated with a system based on pure PVP with that of two other systems containing polymer blends of PVP and Dextran. The tableting capacity was studied for the same systems by measuring the hardness of the tablets made at different compression forces, it was concluded that polymer blends were more performing than a single polymer.

Keywords: *dextran, specific interaction, Miscibility of polymers, polysaccharides, wet granulation.*

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SYNTHESIS AND CHARACTERIZATION OF NEWS BIO-NANOCOMPOSITES WITH DENDRIMER BASIS AND THEIR APPLICATIONS IN DIFFERENT FIELDS.

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ABSTRACT

Dendrimers are new hyperbranched polymers created for the first time in 1979 by Tomalia et al., And since their creation researchers have been so interested in these new types of molecule in the shape of a tree, this is due to their incredible properties. and their various applications in the fields: environmental (such as retentions dyes and adsorption of gases...), biological (such as antimicrobial application, antioxidant activity...) and medical as drug delivery... etc. unfortunately, despite the high number of published works on dendrimers, very few laboratories in Algeria are synthesizing these incredible molecules. The main objective of this work is the synthesis, the characterization and the physico-chemical study of new biodegradable bio-dendrimers doped by silver and copper for antimicrobial application, the structural characteristics of the compounds were determined by various physicochemical techniques such as Fourier Transform Infrared Spectroscopy (FTIR), Nuclear Magnetic Resonance (1H NMR), X-ray powder diffraction (XRD), Thermogravimetric analysis (TGA), Scanning electron microscope (SEM) and Transmission electron microscopy (TEM) ... etc, and the results of the characterizations indeed confirm the desired structure, and the very good results obtained after the applications confirm that these bio-nanocomposites created from simple and inexpensive compounds have incredible properties of adsorptions and eliminations of microbes.

Keywords: *Antimicrobials, particles, Nano, Dendrimers, composites, Nano, Antioxydant*

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CONTROLE DE L'EFFICACITE DU MEDICAMENT ; LE CISPLATINE PAR SON ENCAPSULATION A L'INTERIEUR DES NANOTUBES DE BORE AZOTE A DIFFERENT DIMENSIONS

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ABSTRACT

Le confinement des médicaments est une application récente très importante de la nanotechnologie qui résout énormément de problèmes pharmacologiques et thérapeutiques particulièrement par l'encapsulation des médicaments à l'intérieur des nanotubes et les transporter jusqu'à la cible. Le transporteur du médicament injecté dans le corps est idéal s'il conduit lui-même jusqu'à la cible et libère la dose prescrite (requise) [1].Ces transporteurs à l'échelle 'nano' permettent l'utilisation des médicaments à faibles doses avec de meilleurs résultats et moins d'effets secondaires. Au présent, l'objectif de sélection des systèmes de libération rencontre des défis en mettant en jeu la stabilité, biocompatibilité et la toxicité. Une étude théorique a été employée pour le contrôle d'efficacité de l'entité médicamenteuse par l'encapsulation du Cisplatine à l'intérieur du nanotube de Carbone (CNT). Cette étude a confirmé que ce médicament arrivé jusqu'à la cible sans avoir de modifications sur géométrie. Les nanotubes de Bore Azote (BNNTs) comparés aux nanotubes de Carbone (CNTs), exposent une amélioration remarquable sur les propriétés électroniques, grande stabilité chimique et thermique, une grande résistance contre l'oxydation à température élevée et leur biocompatibilité. C'est dans ce contexte que ce travail a été exécuté. En effet, l'objectif de ce travail est d'une part, la compréhension des phénomènes quantiques qui se produisent lors du confinement, d'autre part, l'étude du devenir et du comportement de la molécule encapsulée à l'intérieur du BNNTs qui joue le role du vecteur L'étude du complexe CISPLATINE@BNNT et leurs optimisations ont été effectuées avec la DFT/B3LYP avec les fonctionnelles PSEUDOGEN pour l'atome du Platine et B3LYP pour le reste du système et les bases LANL2DZ et 3-21G* à l'intérieur des nanotubes de Bore Azote de différents dimensions (9,0), (10,0), (11,0), (12,0), (14,0), (9,9) et leurs diamètres varient entre 7.35898 A et 12.71727 A afin d'examiner la stabilité des complexes.

Keywords: *Confinement, BNNT, Complexe CISPLATINE@BNNT, Mots clés : nanotechnologie, Encapsulation.*

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BIO-INSPIRED LARGE AREA CRACK-FREE INVERSE OPAL FILMS OF TRANSITION METAL OXIDES FOR SMART WINDOW APPLICATION

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ABSTRACT

The history of humanity, as well as the development of our society, are intimately linked to that of materials. The mastery of a new material leads to significant progress that changes everyday life. One only must remember the changes made by silicon in the development of computer science, telecommunications and nanotechnology. However, for the development of materials high temperatures and sophisticated technologies are needed. Yet, for a long time, nature has created such materials under softer conditions. For example, diatoms develop their materials, i.e. surround them with an exoskeleton of porous silica (frustule) that protects them, often performing well above those of our most modern materials, at room temperature and from salts dissolved in water. A finer analysis of the porosity of the frustule, shows that the pores have a periodic distribution of a few tenths of microns, the same order of magnitude as the wavelength of light. They are real "inverse opals." These natural photonic crystals also have the property of focusing the sunlight inside the cell, on the chloroplasts, where photosynthesis takes place! Therefore, how can we draw inspiration from nature to develop the materials of the future? Inspired from the diatoms, we developed a new strategy to fabricate at room temperature large-area crack-free two-dimensional (2D) inverse opal (IO) films of transition metal oxides (TMOs). In this strategy, first a dynamic polystyrene (PS) opal film was formed floating on the surface of water followed by infiltration of a preformed TMO sol underneath the PS opal film. The resultant PS/TMO opal composite film was then deposited on various types of substrates (rigid and flexible) and 2D TMO IO films were obtained following the removal of the PS template by chemical method. Based on this strategy, multiple layer TMO IOs were fabricated through a layer by layer route. The TMO IO films deposited on indium tin oxide coated conductive (ITO) substrates were used as active electrode in the fabrication of electrochromic devices, demonstrating their advanced properties for electrochromic smart windows application. Throughout the year, a building undergoes significant variations in the amount of sunshine. In summer, using glass with high thermal insulation reduces air-conditioning costs. On the other hand, in winter solar radiation is useful for heating the interior of the building. This dynamic problem can be resolved using electrochromic smart windows, taking advantage of their variable light transmission. Energy savings may be 30% over a year in a temperate region. The other advantage is increased visual comfort, since the electrochromic smart window reduces glare while maintaining outward visibility.

Keywords: *Inverse Opal Films, "bio, inspired" materials, transition metal oxides, electrochromic smart windows*

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ELABORATION ET CARACTERISATION DES POUDRES NANOMETRIQUES DE ZNO PUR ET DOPE PAR BI:EFFET DE LA TEMPERATURE DE FRITTAGE

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ABSTRACT

Notre travail a été consacré à l'étude des poudres nanométriques de ZnO dopées par 1% Bi. Les poudres ont été frittés dans un four conventionnel à différentes températures: 650 730 800 900 et1000 'C pendant 15 minutes. L'étude Nous a permis d'analyser les propriétés structurelles et de déterminer les différentes liaisons intervenant dans le processus sol-gel et de voir les modifications qui peuvent intervenir en fonction de la température de frittage. Pour l'identification structurale et morphologique on a utilisé la technique de diffraction des rayons X (DRX) et de la microscopie à force atomique (AFM). Pour déterminer les liaisons intervenant dans le processus sol-gel on a utilisé la spectrophotométrie infrarouge (IR).

Keywords: *ZnO, nanopowder, sintering, gap*

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ZINC OXIDE ANTI-REFLECTION COATING FOR OPHTHALMIC LENSES: THICKNESS CONTROL

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ABSTRACT

In order to enhance the optical efficiencies by increasing the transmission, anti-reflection coatings are widely used in industrial fields such as the manufacturing of ophthalmic lenses, LASERs, optical instrument lenses, and solar cells. Zinc oxide (ZnO) is one of the commonly used materials due to its optical, physical, and chemical properties. To get a good quality antireflection coating two parameters must be controlled the film thickness and refractive index. The aim of this work is to study thickness evolution as a function of deposition parameters. Spin-coated ZnO film thicknesses were controlled according to rotations per minute (RPM), acceleration (ACC), and spinning time (T). The sol-gel process was used to obtain ZnO films. The precursor solution was prepared by dissolving the dehydrate Zinc Acetate and an equimolar amount of ethanolamine in 2-methoxy ethanol, Then, it was spin-coated on a glass substrate. The film thickness was measured by balance method and its homogeneity was checked by an optical microscope. By optimizing the deposition parameters, we show that good film quality has been obtained up to 4500 RPM and 90 second spinning time, where the ACC has a low effect. In the other side, we show that the spinning time affects strongly the film thickness compared to RPM.

Keywords: *acceleration, RPM, spin coating, film thikness, zinc oxide, Antireflection coating, spinning time*

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DYNAMIC SHEAR RHEOLOGY OF POLYMER SYSTEM BASED ON CHITOSAN-MODIFIED LAPONITE CTAB

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ABSTRACT

In this study, a new nanocomposite material based on biopolymer Chitosan (Cs) and biocompatible modified Laponite nanoparticles (LCTAB) have been prepared. Laponite was modified with an organic ammonium cation Cetyl trimethylammonium bromide (CTAB), dispersed in dionised water and then added to chitosane solution. Rheological properties of polymer-nanoparticle aqueous solutions and their connection to the thermic and structural behavior have been investigated. The dynamic shear rheology of Cs/LCTAB hybrids were studied at different temperatures. The structural characteristics of the organically modified clays as well as the nanocomposites where investigated by X-ray diffraction scans (XRD). Thermal properties were studied with thermogravimetric analyses (TGA). Results that indicate the enhancement of thermal property upon Laponite addition. A partially registered exfoliation state for nanocomposites based on biopolymer films. The thermal stability was found to be better for the nanocomposites than for the pure Chitosane. In dynamic, it was observed that all measured viscoelastic properties were influenced by clay content. The modified Laponite addition reduced the gelation time. The gel formation dynamic moduli exhibited higher values for Chitosane LCTAB, compared with values of neat polymer. Measured viscoelastic properties were influenced by temperature and confirmed that Chitosane solution behaved as a weak-gelwhich are an indication of a good stability and a tendency of gel formation.

Keywords: *Laponite, Dynamic, CTAB, Chitosane, Nanocomposite.*

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NEW POLY(ETHYLEN ADIPATE)/LAYERED SILICATE NANOCOMPOSITES: PREPARATION AND MECHANICAL PROPERTIES.

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ABSTRACT

The poly(ethylene adipate) (PEAd)/layered silicate nanocomposites have been synthesized by simple melt extrusion of PEAd and and organically modified montmorillonite (C18-mmt) at 150 Â°C. The properties of the modified montmorillonite and the nanocomposites was characterized by FT-IR, XRD, SEM, EDX and Zeta seizer analysis to obtain the exact structure of nanocomposites and investigated the d-spacing of both C18-mmt and intercalated nanocomposites.. The study showed several stacked silicate layers with random orientation in the PEAd matrix. This nanocomposite exhibited a significant improvement in mechanical properties in both solid and melt states as compared with that of PEAd matrix without clay.

Keywords: *Mechanical Properties., nanocomposites, montmorillonite, poly(ethylene adipate)*

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SYNTHESE ET CARACTERISATION D'UNE MCM-41 DOPEE PAR LE CUIVRE.

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ABSTRACT

A l'heure actuelle les matériaux poreux sont un domaine de recherche en pleine expansion, grâce aux nombreuses applications auxquelles elles peuvent être associées. Parmi ces matériaux les MCM-41 qui son l'un des matériaux mésoporeux les plus connus et le plus étudie grâce à sa synthèse relativement facile en milieu hydrothermale en présence du cétyl triméthylammonium de bromure. L'objectif de notre travail est tout d'abord de synthétiser des matériaux mésoporeux du type MCM-41 à partir d'un nouveau type d'argile locale abondante à faible coût nommé la « Saïdite » qui sera utilisée comme source à la fois de Si, d'Al et Fe en basant sur l'extraction de ces derniers par la fusion alcaline et de dopée les nanomatériaux synthétisés par incorporation du cuivre à différents rapports massiques Si/Cu (60 ; 80 et 100). Les matériaux obtenus ont été étudiés par différentes méthodes d'analyse Diffraction de Rayon X sur poudre (DRX) ; transformer de Fourier Infra-Rouge et N2 adsorption-désorption. Les résultats de DRX ont été révélés que les propriétés du Si-Cu-MCM-41 synthétisées par les différents rapports de masse de Si/Cu donnent une meilleure organisation structurale, et que le rapport Si/Cu=100 utilisé d'où sa surface spécifique avoisine les 1180 m2 /g et un volume poreux de 0.78cm3 /g était le meilleur rapport utilisé.

Keywords: *Incorporation., DRX, Fusion, Nanomatériau*

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SYNTHESIS AND CHARACTERIZATION OF CA DOPED HEMATITE THIN FILMS

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ABSTRACT

Due to the novel physical properties effects of nanomaterials, they are of great interest for theoretical studies and technological applications. Hematite (α-Fe2O3) thin films, the most stable phase of iron oxide, have been considered as a promising candidate in several fields of nanotechnology such as photovoltaics, photocatalysis, optoelectronics and spintronics, mainly owing to its non-toxicity, natural abundance, and low production cost. Properties of hematite can be greatly improved with addition of dopant. For this purpose, un-doped and calcium doped iron oxide thin films have been prepared using Sol-Gel and dip-coating process. Dopant concentration is varied as 3%, 5% and 7%. The structural, optical and morphological properties of the elaborate samples were characterized by X-ray diffraction, UV-visible spectra, and electron scanning spectroscopy.

Keywords: *Gel, Sol, Iron Oxide, Calcium*

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CHARACTERIZATION OF TIO_2 THIN FILMS DEPOSED ON BY A DIP-COATING

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ABSTRACT

TiO_2 thin films have been obtained by a dip-coating method on Ti. Structural and physicals properties of the films have been examined for different number of dips and annealing at a temperature of 723 K. Scanning Electron Microscopy (SEM) and X rays diffraction (XRD) have been used to characterize the films morphology and composition. These films are anatase phase and nano-metric with a grain size of 18 to40 nm. The photo catalytic activity of the nano-structured TiO_2 thin films were evaluated by the degradation of solo phenyl red 3BL and compared with that obtained using P25 TiO_2.

Keywords: *coating, Dip, TiO2, Thin films, Ti.*

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ELABORATION AND CHARACTERIZATION OF COPPER OXIDE THIN FILMS

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ABSTRACT

The objective of this study is to investigate the effect of the annealing temperature on the structural, optical and electrical proprieties of copper oxide thin films. Spin coating technique has been used to deposit copper oxide (CuO) thin films on a glass substrate. This latter is annealed at a different temperature from 400°C to 600°C, while other parameters such as the concentration of the solution, the rotational speed and the pre-annealing temperature were set respectively at 0.6 mol/l, 3000 rpm and 230°C. To study the properties of the elaborated films, different characterization techniques have been employed such as: X-rays diffraction, Spectroscopy (UV-VIS) and the four-point method. The experimental results showed that: the films have monoclinic structure, the average size of grains varies from 20.05 to 55.98 nm, the transmittance values of the films attained between 59% and 80% in the visible range, the band-gap varied between 3.36 and 3.19 EV and the variety of resistivity ranged between 0.0163 and 0.084 Ω.cm.

Keywords: *nanomaterial, copper oxide, spin coating, Thin films*

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DISCRETE DIPOLE APPROXIMATION STUDY OF THE PLASMONIC PROPERTIES OF SILVER NANOPARTICLES: THE INFLUENCE OF SIZE, SHAPE AND SURROUNDING MEDIUM

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ABSTRACT

Among noble NPs being investigated today, silver nanoparticles (AgNPs) have attracted much interest owing to their potential use in several silver-based devices. In fact, these applications can be achieved thanks to the novel optical properties exhibited by AgNPs under excitation of light; i.e. the surface plasmon resonance (SPR). Therefore, modeling plasmonic properties of AgNPs is necessary to facilitate the thoughtful design of such architectures. In this context, this work consists of understanding the plasmonic behavior of AgNPs under different conditions using both the Mie theory and the discrete dipole approximation (DDA) method. The optical response is investigated for nanospheres, nanowires, nanocubes and nanocylinders. Spectra for extinction, absorption and scattering efficiencies are calculated and discussed. Surface plasmon resonances are found to be tuned just by modifying size and shape of NPs and controlling their dielectric environment.

Keywords: *surface plasmon resonance., discrete dipole approximation, optical properties, Mie theory, Silver nanoparticle*

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PLASMONIC PROPERTIES OF METALLIC NANOCUBES ON DIELECTRIC SUBSTRATE USING 2D FEM SIMULATIONS FOR BIOSENSOR

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ABSTRACT

Due to its exponentially enhanced electric E-fields near the interface between metallic nanoparticles and dielectric medium; the localized surface plasmon resonance (LSPR) wavelength makes it a powerful candidate for emerging technologies such as surface-enhanced Raman scattering (SERS) and biosensors devices. These last mainly based on the identification of LSPR shift and enhanced E-field which may be induced by changing different parameters. In this work; 2D computational simulation of noble nanocubes (NCs) near a dielectric substrate was performed using finite element method (FEM) analysis in RF module with Perfect Matched Layers (PMLs) conditions of COMSOL Multiphysics software to study the effect of size, nanoparticle-substrate gap and material of NCs as well as the surrounding dielectric environment. More specifically the bulk sensitivity SB was deduced. As a starting point, the theoretical analysis shows that the LSPR corresponds to the sharp dip of transmission spectrum as peaks reflection and absorption spectra. Additionally; two peaks corresponds dipole (D) and quadruple (Q) modes were appeared where the E-fields are the most intense in the bottom edges. A red shift of the LSPR is observed by increasing the NCs size where plasmonic field indicates their enhancements. But inverse behaviors were remarked when increasing in the NCs-substrate gap. Moreover, the results also indicate that reflection silver nanocube spectra have sharp LSPR peaks than that of gold one. For both metals silver and gold, increasing of surrounding media refractive index leads to a LSPR red-shift where the tangent is more inclined for silver metal which means that the bulk sensitivity SB of these last is the highest.

Keywords: *Sensitivity, Nanocubes, Dielectric substrate, FEM, LSPR*

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ELABORATION AND CHARACTERIZATION OF ANODIC FILM ON STAINLESS STEEL

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ABSTRACT

The formation of self-organized nanoporous and nanotubular anodic films has attracted recent attention due to fundamental interest in their growth processes and their technological importance as a functional nanomaterial. In this work, the nanoporous oxide layer is formed on the surface of 304 type stainless steel by simple anodizing in the sulfuric acid electrolyte at different concentrations under a dissolution mechanism. The nanoscale morphology of anodic film after anodization was analyzed by Scanning Electron Microscopy (SEM). The pores diameter was changed at a different concentration of the electrolyte and anodizing time. The films contain high concentrations of iron, chromium, and nickel species distributed throughout the film thicknesses.

Keywords: *stainless steel., Nanoporous, anodization*

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METASTABILITY AND HYDROGEN DIFFUSION UNDER ILLUMINATION IN SILICON THIN FILM ELABORATED BY RF MAGNETRON SPUTTERING: INFLUENCE OF HYDROGEN DILUTION

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ABSTRACT

In order to contribute to the understanding of effects of the hydrogen dilution on the structural and optical properties of hydrogenated amorphous silicon thin films (a-Si:H), a detailed study has been conducted. The samples were elaborated by radio frequency (RF) magnetron sputtering, under a hydrogen (10-50 %) and Argon gas phase mixture (Ar + x% H2), Then they were exposed to prolonged illumination under the solar simulator. The purpose of this work is to study the influence of hydrogen dilution on aging and its diffusion under illumination. Optical transmission and Fourier Transform infrared spectroscopy measurements (FTIR) were performed to check the changes of the films properties before and after the light-soaking. The results indicate that the incorporation of hydrogen in the plasma decreased the rate of deposition, which also corresponds to an increase in the static index in the material, which led to reducing the defect density, and results in a decrease in the optical gap. It appears clearly that a-Si: H samples illuminated for 12 hours in the solar simulator have much larger absorption bands than that of a-Si:H not aged. Our results have shown that hydrogen content plays an important role in the elaboration of a-Si: H by sputtering and that it is strongly involved in its metastability.

Keywords: *FTIR measurements., Optical properties, Hydrogen diffusion, Hydrogen dilution, Silicon solar cells, Sputtering*

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WELL-DAWSON POLYOXOMETALATE [HCS5P2W18O62, 16H2O]: SYNTHESIS AND SPECTROSCOPIC CHARACTERISATION

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ABSTRACT

Wells-Dawson Heteropolyanions type and their transition metal substituted derivatives are a large group of transformable anionic clusters that have multiple applications including catalysis, material sciences, medicine, and biology. Many of which are related to their redox properties. The two best known heteropolyanions are the Keggin-type [Xn+M12O40](8-n)- , the latter ones called the Wells-Dawson type [(Xn+) 2M18O62](16-2n)-. The synthesis, IR, 31P NMR, EDS and cyclic voltammetry characterizations of a Wells-Dawson-type heteropolyanion, which contain cesium (HCs5P2W18O62, 16 H2O) are reported. This compound was synthesized for application in oxidation catalysis. Acidic cesium salt of Wells-Dawson heteropolyanions (HCs5P2W18O62, 16 H2O) was obtained by addition of cesium ions to Dawson acid form H6P2W18O6224H2O.

Keywords: *synthesis and spectroscopic characterization., Dawson type, Wells, Heteropolyanions*

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SYNTHESIS AND CHARACTERIZATION OF AG2S-TIO2 NANOCOMPOSITES

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ABSTRACT

Due to their size dependant electronic and optical properties, semicondutor quantum dots take attention of many scientists . Particularly, silver sulphide possesses several applications in photocatalysis and medical imaging[6]. In the present study, Ag2S-TiO2 nanocomposites was prepared by a facile chemical reaction at room temperature. First, the adsorption of silver ions on TiO2 in wet conditions optimized. Then, a solution containing Ag+/TiO2 and 2-mercaptoethanol (noted RSH), is prepared. The later plays the role of sulfur atom source. The obtained samples were characterized by X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM) and Fourier Transform Infrared Spectroscopy (FTIR). After RSH addition, XRD pattern present the features of acanthite Ag2S and anatase TiO2. FTIR spectroscopy was allowed to observe the vibration of Ag-S bonds of formed Ag2S. SEM observation shows spherical shaped crystallites. These results are in good agreement with TEM results which indicate uniform distribution of Ag2S (10-40nm) on titanium oxide surface.

Keywords: *RSH, Ag2S, Semiconductor, TiO2*

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ELABORATION AND CHARACTERISATION OF THE LEAD-FREE PIEZO CERAMIC BNLZT

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ABSTRACT

Thanks to the nefactivity and pangs of lead contained in piezoelectric ceramics (PZT and its derivatives), too much research has been done to replace this category of ceramics; by modifying the lead by other elements and by trying to obtain almost the same properties of the PZT which make them dominate the piezoelectric market. The present work describes the preparation of pellets from a lead-free piezoelectric ceramic powder BNLZT . These pellets are then sintered at high temperature and characterized by X-ray diffraction (XRD), infrared spectroscopy (AIR) and scanning electron microscopy (SEM).

Keywords: *characterization., sintering, Elaboration*

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ELABORATION OF TIC-FE(AL)/TI3ALC2 BY SINTERING AT 1100°C FROM TI3ALC2-FE MIXTURE

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ABSTRACT

TiC-Fe(Al) compounds have attracted much attention by researchers for their interesting properties, but it was difficult to control the size of WC grains by conventional method synthesis. In this case we propose to synthesis a composite TiC-Fe(Al) from Ti3AlC2-40% volFe mixture milling for 20 minutes, then sintred at 1100Â°V for 2hours under argon atmosphere.During sintering the Ti3AlC2 decomposed to nanoparticles TiC and Al atom which has reacted with iron to form an intermetallic Fe(Al). The DRX analyses revealed that, the fritted contains TiC, Fe(Al) and residual of Ti3AlC2 phases, its Young's modulus and hardness were estimated by means of nano indentation tests, the wear resistance was studied by estimating the friction coefficient at various velocities speeds and the resistance to oxidation was evaluated by DSC/TGA method.

Keywords: *Ti3AlC2, sintering, Fe(Al) intermetallic, TiC/Ti3AlC2 matrix, friction coefficient.*

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USE OF PLANT LEAF EXTRACT IN THE BIOSYNTHESIS OF NANO-OBJECTS BASED ON SILVER

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ABSTRACT

Interest in silver nanoparticles (AgNPs) has increased steadily in recent years, due to their particular physical and chemical properties. In this present work a green approach has been used to synthesize silver nanoparticles using plant leaf extract by the biosynthesis method. The bimolecules present in the plant extract induces the reduction of silver metallic ions Ag+ from metal salt Ag2SO4 to silver nanoparticles. The nanoparticles obtained were characterized using UV-Visible spectroscopy (UV-vis), Fourrier Transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy (SEM). The formation of silver nanoparticles was first demonstrated by the color solution change from light brown to reddish brown in one hour reaction time. The FTIR spectrum of the plant extract showed significant peaks at 3267 cm-1, 2922 cm-1, 1560 cm-1, 1400 cm-1, 1261 cm-1, 1193 cm-1, 1139 cm-1, 1049 cm-1 and 921 cm-1. However, the FTIR spectrum of synthesized silver nanoparticles showed the appearance of new absorption bands at 2328 cm-1,2169 cm-1, 1732 cm-1 ,1622 cm-1 and 1384 cm-1, which means the formation of new chemical bonds and therefore a possible reaction between the two reactants, but also the presence of the same bands already existing in the plant extract with lower intensities and a slight shift, which is explained by the fact that the compounds present in the plant extract act not only as a reducing agent but also as a stabilizers agent in nanoparticles surface. The SEM analysis indicated that the AgNPs morphology is spherical and have different sizes.

Keywords: *plant leaf extract, Green synthesis, Silver nanoparticles, UV, FTIR.*

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STUDY OF SUPPORTED GOLD NANOPARTICLES NEW CATALYSTS FOR THE SELECTIVE OXIDATION OF ORGANIC MOLECULES

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ABSTRACT

Gold, which is a noble metal, has long been regarded as catalytically inactive. In 1987 the group of Dr Haruta discovered the catalytic properties quite remarkable of gold nano-particles at low temperature. Furthermore, the clay minerals are abundant natural materials, clean and inexpensive, which can be used in catalysis. These materials have a high adsorption capacity that is particularly interesting for the deposition of catalytic noble metal particles, in the interlamellar space of clay. In our work, gold particles of nanometer size, catalytically active, are deposited on Fe and Al pillared montmorillonite - Na+, by deposition - precipitation. The objective is to study the influence of the nature of heat treatment in the selective oxidation of cyclohexane. The characterization by XRD shows the expansion of the interlamellar distance of clay after intercalation by Fe or Al. Characterization by UV-Vis shows that most gold particles are smaller; the maximum absorbance band is shifted to smaller wavelengths. The catalytic activity of the catalysts was tested in the oxidation reaction of cyclohexane by tert-butyl hydro-peroxide. Several parameters have been studied: the nature of heat treatment (H2, O2 or H2 + O2), treatment temperature and also the solvent effect. The catalysts studied in this work lead to the selective production of cyclohexanone, compared to cyclohexanol: the catalysts reduced under H2, which seems to have the smallest particles, leads to the highest cyclohexanone production. A yield of 38% has been observed with the catalysts reduced at 200 °C compared to those reduced at 500 Â° C (18%).

Keywords: *plasmonic catalysis, nanoparticle synthesis, gold nanoparticles, selective oxidation*

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SYNTHESIS AND CHARACTERIZATION OF CDS-CDO NANOCOMPOSITE THIN FILMS

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ABSTRACT

Nanocomposite thin films of CdS-CdO have been prepared using a simple and low cost chemical route, followed by annealing in air at 300°. XRD analysis confirmed that both CdS and CdO phases coexist in the films, with nanometric crystallite sizes of 13 nm and 20 nm for CdS and CdO, respectively. SEM and EDX techniques were used to analyze surface morphology and composition of the films. The recorded UV-visible-NIR optical transmittance revealed an indirect optical band gap of 1.84 eV, which is in agreement with other experimental results [1]. The optical constants have been extracted from fitting of transmittance data by using the spPS (seed preprocessed Pattern Search) algorithm . As a result, refractive index (n), extinction coefficient (k), complex dielectric function (ε) and optical conductivity (σo) were obtained.

Keywords: *band gap, CdS CdO nanocomposites, optical properties*

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EFFECT OF AG ON TI OXIDE LAYER FORMED AT DIFFERENT TEMPERATURES FOR PHOTOCATALYTIC PROPERTIES

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ABSTRACT

This study is focused on elaboration of titanium (Ti) oxide thin layer doped with different amount of silver (Ag) for phococatalytic purpose. The Ag/TiO_2 thin film was deposited on silicium substrate by physical vapor deposition at 6 10-6 mbar. Samples were prepared from TiO_2 powder which 3, 5 and 10 % of Ag mass was added. The samples obtained were heated to 300, 400 and 500°C in order to crystalize the Ti oxide. The morphology of the oxide formed was investigated by Scanning Electronic Microscope (SEM). The images reveal that the presence of silver influences the nanoparticles formation and their uniformity. At 300°C and at 10%Ag, denser and uniform nanoparticles were formed. Nevertheless, relatively the same result was obtained for 3% Ag calcined at 500°C. These different results obtained allowed to optimize the Ag concentration to obtain the best compound in order to improve the Ti oxide photocatalytic properties. The thin layer identification was carried out with X-ray diffraction (XRD) and Raman spectroscopy (RS). The XRD results show that the amount of Ag influence the Ti oxide formed after heating. For the same temperature, the oxide formed was rutile for Ag amount of 5 % while at 10 % it was brookite. This last is well known for its photocatalytic activity relatively higher than anatase and rutile. The RS performed for these samples confirms the oxides formed after calcination for the different amount of Ag added. Finally, the photocatalytic properties were performed with Ultra-Violet radiation (UV).

Keywords: *XRD, photocatalytic, Ti oxide layer, Ag, SEM.*

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THE MAGNETISM IN NANO STRUCTURES BASED VN AND INN

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ABSTRACT

We report on first-principles study of the structural, electronic and magnetic properties of the nanostructures based VN and InNusing the full-potential linearized augmented plane waves method within approximation generalized gradient. We investigate the structural, electronic and magnetic properties of nanostructures based VN and InN. The results including equilibrium lattice parameter, band structures, and total and partial densities of states for spin majority and spin minority. The calculated total magnetic moment nanostructures based VN and InN in ferromagnetic state is found to be 4.00µB.

Keywords: *(VN)1/(InN)1 nanostructure, InN, VN, Magnetism*

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GROWTH STUDY OF SILICON NANOWIRES BY CHEMICAL METHOD USING METAL CATALYST

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ABSTRACT

In the present study, plasma enhanced chemical vapor deposition (PECVD) reactor has been used to grow silicon nanowires SiNWs using the vapor-liquid-solid (VLS) process. Tin (Sn)/Indium (In) were used as a catalyst. Thin films of the Sn/In catalyst of thickness 1 nm are deposited on crystalline (100) silicon wafer (c-Si) and hydrogenated amorphous silicon a-Si:H/c-Si, were prepared by thermal evaporation method at a pressure of 2—10^{-6} mbar vacuum. The samples were loaded into the PECVD chamber and they were heated up to 180 Â°C under vacuum. A hydrogen plasma was applied to reduce the Sn/In oxide and to form Sn/In droplets. After the hydrogen plasma treatment, the temperature of the substrate holder was increased to 400Â°C, 500Â°C, and 600Â°C. Silane precursor gas (SiH4) was introduced into the chamber to begin the SiNWs growth. Details of synthesis conditions for the SiNWs are summarized in Table 1. The surface morphology of the samples was checked using a Hitachi S4800 scanning electron microscope (SEM) (see Fig. 1). It was observed that for Indium catalyst at 600 °C no SiNWs growth due to evaporation of In catalyst particle (no catalyst), this could be due to the high vapor pressure of In catalyst at 600Â°C (see Fig. 2). It is found that by decreasing the substrate temperature to 400 °C, Tin catalyzed SiNWs become smaller and only few Indium-catalyzed SiNWs are growing (see Fig. 3).

Keywords: *Tin (Sn)/Indium (In) catalyst., Plasma enhanced chemical vapor deposition (PECVD), Silicon nanowires SiNWs*

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FP-LAPW STUDY OF OPTOELECTRONIC AND ELASTIC PROPERTIES OF GDCRO3 CUBIC PEROVSKITE: GGA+U AND HYBRID FUNCTIONALS INVESTIGATION

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ABSTRACT

The study of structural, electronic and optical properties of GdCrO3 ferromagnetic cubic perovskite is carried out by full potential linearized augmented plane wave (FP-LAPW) + On-site hybrid method and the modified Becke-Johnson (mBJ-GGA) within density functional theory (DFT). To calculate the total energy, the exchange-correlation potential has been treated with the GGA-PBEsol potential, which has proved to be very effective in numerous material problems. Moreover, GGA-PBEsol+U based potential and hybrid exchange-correlation functional have been also used for the electronic, optical and elastic properties. Given the parameter estimates, such as lattice parameter, they have been shown to be consistent with the available data. The spin-polarized electronic band structure and the calculated density of states using GGA+U and mBJ-GGA show that the studied compound has a semiconductor behavior with 3.44 - 3.035 eV for the band gap while hybrid method shows that it is a half-metallic with a band gap of 3.137 eV.

Keywords: *mBJ GGA, GGA+U, Hybrid exchange, correlation functionals, Optical properties, FP LAPW*

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SYNTHESIZE AND STUDY OF STRUCTURAL, OPTICAL AND MAGNETIC PROPERTIES OF CO3O4/SIO2 NANOCOMPOSITE

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ABSTRACT

In the present work Co3O4/SiO2 nanocomposite was synthesized by impregnation method, followed by calcinations at different temperatures (T = 200, 350, 500, 700 °C). The samples where characterized by several techniques: XRD, TEM, UV-visible, FTIR and VSM. After impregnation and calcinations at T < 350 °C, the samples are amorphous. After calcinations at T ≥ 350 °C, the structural study revealed the formation of nanosized phase (13-16 nm): Co3O4 spinel phase. Cobalt oxide nanoparticles have spherical shape with strong agglomeration. The particle size determinate by TEM images is about 19 nm. The bands gaps of Co3O4, estimated from the UV-visible absorption, are blue shifted in comparison to the bulk state. Their values are 1,8 eV (with a sub-band of 2,9 eV). The Co-O vibrations in Co3O4 were identified at 560 and 640 cm-1, are corresponding to the vibration of octahedral and tetrahedral complexes respectively. The magnetic study revealed the superparamagnetic behavior of the Co3O4 nanoparticles, with high saturation magnetization value of 32 emu/g compared to the bulk state. These results highlight the positive effect of preparation method to Co3O4 magnetic properties..

Keywords: *magnetization, absorption, Co3O4, nanocompsites, superparamagnetic*

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A COMPREHENSIVE STUDY OF THERMODYNAMIC AND DYNAMIC BEHAVIOUR OF WATER AND N-HEPTANE CONFINED IN BIFUNCTIONALIZED MESOPOROUS ORGANOSILICA SBA-15

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ABSTRACT

Recently, periodic mesoporous organosilica (POMs) are known to be promising candidates for the use confinement of nanoparticle in adsorption and separation science, controlled release of drugs or antioxidants ...etc Â One of the major interests of the POMs is the possibility to functionalize the channel pores of the inorganic framework through the covalent coupling of an organic moiety to adjust their properties to different types of applications. The well defined pore structure presented by SBA-15 material has made it very good candidate for fundamental studies at testing confinement for the characterization of porous solids. Here, we report the detailed study of the thermodynamic and dynamic properties of water and n-heptane confined in hybrid bifunctionalized SBA-15 materials, mainly focusing the impact of confinement on the behaviour of fluids (water and n-heptane) on the surface chemistry of nanapores investigated by spectroscopic and adsorption techniques. First, the one-pot pathway of co-condensation method, which is characterized by simultaneous condensation of inorganic and organic precursors in a single step, is used to introduce phosphodiester groups in the mesoporous surface of SBA-15. The second modification inner of the surface pore is the trimethylsilylation of the silanols groups through the post-synthesis grafting of TMS groups. The adsorption and conductivity of water and n-heptane confined in functionalized nanoporous silicas SBA-15 are studied by means of differential scanning calorimetry (DSC), complex impedance spectroscopy (CIS), and NMR experiments. The impedance spectra of all samples previously dried and then subjected to vapour pressure of water and n-heptane showed that the conductivity is connected to the transport of ionic charge while the ionic diffusion is not detected when the silica samples are dry. Adsorption and NMR experiments shows that the surface chemistry of the nanoporous SBA-15 modifies silica based properties from hydrophilic to hydrophobic.

Keywords: *nanoporous silica SBA, 15, functionnalization, fluid confinement.*

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INTERPENETRATING NETWORK BEADS BASED ON ALGINATE AND NA-SEPIOLITE: REACTION PARAMETERS AND SWELLING CHARACTERISTICS

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ABSTRACT

In this paper an interpenetrating polymer network xerogels nanobiocomposites beads composed of sodium alginate as matrix, sodium sepiolite as needls fibrous clay and polyacrylamide was prepared to developed new xerogels nanobiocomposites beads with improved swelling behaviors. Results : The properties of resulting xerogels nanobiocomposites beads were characterized by different techniques (i.e. X-ray diffraction analysis (DRX), Infra spectroscopy analysis (IRTF) and Scanning Electron Microscopy (SEM)). . The surface morphologies of the xerogels nanobiocomposites beads were improved due to the incorporation of polyacrylamide polymer as shown by Scanning Electron Microscopy (SEM) observation. Infra spectroscopy analysis (FTIR) indicate that acrylamide monomer has been grafted onto onto interpenetrating nanobiocomposites beads and sepiolite fibrous clay needls participated in polymerization reaction. Also, X-ray diffraction analysis (XRD) revealed an exfoliated nanobiocomposites xerogles beads structure. The influences of reaction variables (i.e : the content of sepiolite and initiator concentration) on the swelling properties of the interpenetrating xerogels nanobiocomposites beads in deionized water were investigated. It was found that the equilibrium swelling degree of obtained interpenetrating xerogel beads (qe= 506.09 g/g) higher than that of non-interpenetrating ones (qe= 270.94 g/g). Conclusion: interpenetrating xerogels beads developed in this study, showing potential to use as low-cost and eco-friendly bioadsorbant for water treatment.

Keywords: *swelling, beads, interpenetrating network, fibrous clay, Alginate, reaction parameters*

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SPECTROSCOPY AND CRYSTALLINE STRUCTURE OF DIBROMODURENE

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ABSTRACT

This work is part of structural exitations on hexasubstituted benzen crystals. The crystalline structure of DBD is determined by X-rays diffraction at 293K. The structure is monoclinic (P21/m, Z= 2), these two molecules composing the asymmetric unit violate the suggestion of Kikaigorodsky which provides that the centres of symmetry molecular are related to the centre of symmetry crystallographic. The originality of structural aspect is due to molecular disorder which is caracterised by 2Ï€ /3 jumps in the benzene plan.So, DBD molecular conformation is calculated by DFT technics using MPW1PW91 end B3LYP exchange correlation functionals.Two conformations have nearly the same formation energy, one presents C2h symmetry and the other Cs.Experimentally, the observed structure is nearest Cs symmetry than C2h one. Generally in the product benzene halogéno-methyls, the steric obstruction between the halogens and methyls does not appear, because no significant deviation of the atoms compared to the average plan of the molecule is observed.

Keywords: *DFT., X Rays diffraction, Dibromodurene, Crystalline Structure*

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FORMULATION, PHYSICOCHEMICAL AND RHEOLOGICAL CHARACTERISTICS OF MULTIPLE EMULSIONS STABILIZED BY NATURAL POLYMERS FOR MEDICAL APPLICATIONS

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ABSTRACT

Multiple emulsions have been proposed to have numerous uses, It is important to remember that the majority of active principles in the treatment of cancers are hydrophilic. In pharmaceutical industry, multiple emulsions are of real interest since, like liposomes and unlike microparticles, their internal aqueous compartments make it possible to transport hydrophilic active principles. Biopolymer-stabilized systems were investigated using the stepwise method or the influence of different formulation parameters and technological factors on the W/O/W multiple emulsion stability were evaluated. The various emulsions formulated are concretized by a physicochemical, morphological, viscosity, and a stability study as a function of time at different storage temperatures has been performed. The results obtained showed that the formulated systems are on the whole stable of non-Newtonian fluid type, so the good dispersion of the oil droplets in the water and water in the oil has been well confirmed by the microscopic analysis. Although multiple emulsions are very unstable systems, this work could achieve the formulation of emulsions with an absence of instability phenomena, and this duration of stability increases according to the concentration of biopolymer. Â

Keywords: *Rheology, Stability, Multiple emulsions, Physicochemical*

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EXTRACTION AND CHARACTERIZATION OF CELLULOSE NANOCRYSTALS (CNC) FROM "EL DISS": A NOVEL BLEACHING METHOD

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ABSTRACT

Considerable efforts are deployed for the development of new materials that combine attractive performances and environmental compatibility in order to substitute the many petroleum-based materials. Nanocrystals of cellulose has a many properties such as: biodegradability and renewability. All these interesting characteristics have triggered the use of CNC as reinforcement phase in thermoplastic and/or thermosetting matrices for many different applications.Â Acid hydrolysis and alkaline treatement which involves chlorites sodium were found to be the most effective routes to extract cellulose nanocrystals. The present work is an exploitation of a wild plant (EL DISS) on the extraction of cellulose nanocrystals (CNC) by following an extraction process in order to substitute the (NaClO2) -based bleaching step by the (H2O2). The characterization by DLS of CNC revealed that the particle transverse length varies between 100-150 nm. The (FTIR) and the zeta-sizer indicate the chemical composition and the surface of the obtained CNCs was negatively charged during the chemical treatment of the extraction process. Thermal stability was also studied by thermogravimetric analysis.Â

Keywords: *Cellulose bleaching, whiskers, Cellulose nanocrystals (CNC), Sulfuric Acid Hydrolysis*

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STRUCTURAL, OPTICAL, ELECTRICAL AND MECHANICAL PROPERTIES OF ZNO CO-DOPED AG, MG THIN FILMS : ANNEALING TEMPERATURE EFFECT.

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ABSTRACT

In this work, ZnO-Ag-Mg layers were developed by thermal evaporation (at high temperature and very low pressure) of powder mixtures of zinc oxide, magnesium and silver with a respective mass percentages (80-10-10)%. The deposited layers on glass substrate were investigated with respect to effect of annealing temperature after deposition on the evolution of structural, optical, electrical and mechanical properties of the layers was investigated. It has been shown that after annealing at 300°C, zinc oxide (ZnO) begins to crystallize with hexagonal wurtzite structure which increases the material's cristallinity with annealing temperature. The transmittance of the layers increases with temperature to a maximum of 75% while a change of the electrical properties from a conductive layer with 14.29 Ω of resistance value towards a semiconductor layer with resistances around kΩ. Also, it was noticed that the resistance to plastic deformation (Hardness) of the layers does not respect the hall-Petch rule due to very small grain size of less than 100 nm.

Keywords: *vis, Uv, Raman spectroscopy, Thermal Evaporation, Thin films, Mg, Ag, ZnO, Nanoindentation*

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EFFECT OF CHEMICAL TREATMENT OF FIBERS ON THE MECHANICAL PROPERTIES OF HDPE/FIBER ALFA COMPOSITES

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ABSTRACT

This study investigated the effects of chemical treatment of fiber Alfa on the mechanical behaviour of high-density polyethylene /plant fiber composites. The Alfa fibers are used as reinforcement after being treated by aqueous NaOH (caustic soda) at 3% for 24, 48 and 72 hours at 25Â°C. It is found that the stiffness (Young's modulus) and the tensile strength properties of composites with treated fibers were significantly improved compared to those elaborated without fiber treatments. However, these mechanical properties decline in the case of composites with fibers treated for 72. This decrease is attributed to the alteration of the fibers under chemical treatment time prolongation effect.

Keywords: *polyethylene, Alfa natural fibers, chemical treatment, composite.*

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OPTIMIZATION OF CISE ABSORBENT LAYER BY SPRAY PYROLYSIS ONTO THE GLASS SUBSTRATE USING DIFFERENT SUBSTRATES TEMPERATURES

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ABSTRACT

Currently, solar cells based on thin films have been imposed in the photovoltaic market, especially those based on chalcopyrite CuInSe2 (CISe) material. Numerous studies are in progress in order to improve its characteristics and to reach high-performance solar cells. In the present work, CuInSe2 thin films have been elaborated by a chemical method of spray pyrolysis on glass substrates. The three substrate temperature Ts=450°C, 500Â°C, 550°C were used. Four peaks in diffractograms have been presented, indexed as (112), (220), (400), and (424). according to the JCPDS 23-0209 file of CISe chalcopyrite phase, this confirms a polycrystalline orientation, however, a zoom on the plane (112) shows the repositioning of the peak (112) towards its preferential orientation depends temperature increases, the EDS Results shows that the (Cu/In) ratios of the films vary from 1.0 to 1.1, this indicates a stociometrie of the CISe layer. CISe films present a good optical absorption, especially in the visible range. A relatively better absorption is obtained at TS = 550 °C. The obtained results confirm a high position of CISe as a preferment absorbent layer.

Keywords: *solar cells, CuInSe2 thin films, XRD.*

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TIN LAYER EPITAXIAL GROWTH DEPOSITED AT DIFFERENT RADIOFREQUENCY POWERS ONTO THE MONOCRYSTALLINE SUBSTRATE MGO

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ABSTRACT

In this paper, it is suggested to use Titanium Nitride (TiN) layer as a rear contact in Solar Cells. TiN layers were deposited by radiofrequency magnetron sputtering onto two monocrystalline substrates MgO and SrTiO3, the variation of RF powers was carried out to (150W, 200W). It is found that the sample deposited at 200W shows a good crystallinity, two peaks (200), (400) have been appeared, they belong from the same family as (100) confirming the orientation crystalline of TiN. Both texturation and epitaxial growth have been confirmed by phi-scan, we observed four intense peaks separated by 90°. Moreover, the TiN deposition on SrTiO3 shows the same crystallographic behavior as it exists in TiN deposited on MgO. Hence more, a scan Omega has made on the two films deposited in 150W and 200W, thin peaks obtained Confirm the best orientation for the film deposited in 200W. However, The chemical composition exhibits a stoichiometric film TiN, especially when a 200W was used. It is the similar remark about SrTiO3 substrate. In addition, the morphology displays a well-formed grains and homogenous surfaces.

Keywords: *phiscan, epitaxial growth, TiN, MgO substrate.*

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RHEOLOGICAL STUDY OF TERNARY NANOCOMPOSITES POLYPROPYLENE/POLYAMIDE66/NANOCLAY MODIFIED BY LAYERED SILICATE NANOCLAY

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ABSTRACT

This work aims to investigate the structure-property relationship in ternary nanocomposites consisting of polypropylene as the matrix, polyamide 66 as the minor phase and treated nanoclay DELLITE 67G as the reinforcement. All PP/PA66/Nanoclay systems with polypropylene grafted maleic anhydride PP-g-MAH as a compatibilizer were prepared via melt compounding and characterized in terms of nanoclay content. The morphological structure was investigated by scanning electron microscopy. The rheological behavior of the nanocomposites was determined by various methods, viz melt flow index (MFI) and parallel plate rheological measurements. The PP/PP-g-MAH/PA66 nanocomposites showed a homogeneous morphology supporting the compatibility improvement between PP, PA66, and nanoclay. SEM results revealed the formation of nanocomposites as the nanoclay was intercalated and exfoliated. In the ternary nanocomposites, the rheological behavior showed that the complex viscosity is increased with increasing the nanoclay content; however, at low frequencies, this increase is governed by the content of nanofiller while at high frequencies it is mainly determined by talc content. A similar trend was also observed for the variations of storage modulus (G') and loss modulus (G") with frequency. The results showed that the use of nanoclay considerably affects the melt elasticity.

Keywords: *modified nanoclay, polyamide66, polypropylene, nanocomposites, rheology*

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PREPARATION OF SILICA-CARBON NANOTUBES COLLOIDAL SOLUTIONS: APPLICATION TO KEVLAR REINFORCEMENT

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ABSTRACT

The reinforcement of materials by nanoparticles has been widely studied and applied in many fields of engineering due to their unique surface effects, chemical activity and their particular physical properties. The aim of this study is to improve the dynamic mechanical properties of KevlarÂ®29, by the impregnation of the later, with various weight percentage of colloidal silica-carbon nanotubes solution. Firstly, the colloidal solutions of silica / CNTs are prepared using LUDOX HS40 suspension mixed with weight fraction 50, 60 and 70% of silica and 0.02% of CNTs in presence of ethylene glycol (50, 40 and 30%). The prepared solutions are used subsequently to impregnate the Kevlar using a deep flask. The obtained samples of the impregnated Kevlar with silica and Multiwall carbon nanotubes are characterized by scanning electron microscopyÂ (SEM) and the mechanical tensile test. The obtained results using SEM characterization, show a good dispersion of nanofiller without any significant agglomeration. Hence, large improvement in mechanical properties is observed, in the impregnated Kevlar with colloidal solutions containing less than 60% of silica. Indeed, above this ratio, the mechanical properties decrease. Therefore, the nanofillers rate affect directly the different properties of the studied materials. The rate of nanomaterials should be optimized in order to ensure optimal properties at low cost.

Keywords: *SEM, Carbon Nanotubes, Silica, Colloidal solution, Kevlar, tensile test.*

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FUNCTIONALIZED MESOPOROUS SILICA MATERIALS FOR DYES ADSORPTION

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ABSTRACT

Hexagonal ordered mesoporous material MCM-41 was synthesized under basic media using pure silica, cetyltrimethylammonium bromide and tetramethylammonium hydroxide at 90°C, followed by a hydrothermal pore expansion treatment in the presence of dihexylamine (DHA) at 130°C for 72 h. The post-synthesized material (DHA-41A), the material obtained after selective ethanol extraction of DHA (DHA-41B) and the organic-free material obtained after carbonization of DHA-41A and/or DHA-41B afford (DHA-41C). Small angle X-ray diffraction, nitrogen adsorption-desorption measurements, FT-IR, thermogravimetry and zetametrie were used to characterize all the samples. The results of material analyzes showed significant differences in porosity, mass loss and especially surface charge, which led us to test different dyes. The samples were evaluated as adsorbent for two dyes Naphtol Green B (NGB) as anionic dye and Rhodamine B (RB) as cationic dye. DHA-41A and DHA-41C were found to be fast adsorbent for the anionic and the cationic dye respectively. Adsorption capacities of NGB onto DHA-41A and RB onto DHA-41C, were found 430.51 and 528.90 mg/g respectively. Adsorption kinetic data were tested using pseudo-first-order and pseudo-second-order models. The results show that the pseudo-second-order kinetic model fitted better than the data obtained from pseudo-first-order model for the adsorption of anionic dye onto DHA-41A and cationic dye onto DHA-41C. Adsorption data were modeled using Langmuir and Freundlich adsorption isotherms. The result revealed that the adsorption of the anionic dye onto DHA-41A and the cationic dye onto DHA-41C, fitted very well with the Langmuir isotherm model than Freundlich isotherm model.

Keywords: *Adsorption kinetics, Dihexylamine, 41, MCM, Mesoporous materials, Isotherm, anionic and cationic dye*

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ORIENTATION EFFECTS ON TRIPLY AND DOUBLY DIFFERENTIAL CROSS SECTIONS OF HYDROGEN CHLORIDE MOLECULE DOUBLE IONIZATION

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ABSTRACT

The triply and doubly differential cross sections of double ionization of hydrogen chloride molecule impacted by electrons are investigated within the first Born approximation. The incident and scattered electrons are represented by plane wave functions, whereas the target is described by means of a single-center molecular wave function. In this work, we study the contributions to the triply and doubly differential cross sections of the four outermost orbitals of the HCl, namely, 4s, 5s, 2px, and 2py, considering the case where the two outgoing electrons are ejected from two different subshells. We report a strong dependence versus the target orientation by pointing out the signature of the well-known double ionization processes, namely, the shake-off and the two-step 1 mechanisms. Let us note that in this first Born approximation, the two-step 2 mechanism is not observed. In specific cases, the similarities of the multi-differential cross sections are easily explained by the space-orientation of the dominant atomic orbital in the molecular one. Finally, the target orientation effects on the secondary electron energy distributions are reported and discussed.

Keywords: *differential cross section., electron impact, Born approximation, molecular, electron scattering*

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DETERMINATION PAR NANOINDENTATION DES CARACTERISTIQUES MECANIQUES DE L'ACIER 100CR6 TRAITÉ THERMIQUEMENT À 780°C

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ABSTRACT

La nanoindentation par la méthode d'Oliver et Pharr est utilisée pour déterminer la microdureté Hv0.5, le module de Young et la dureté HIT du 100Cr6 à l'état brut et traité. L'acier est traité thermiquement à 780 °C avec maintien de 05 min et de 15 min dans le four, refroidissement à l'eau et à l'huile et revenu de détente pendant 05 min. Les caractéristiques du 100Cr6 brut sont : 227 Hv, 2601 HIT et 208 GPa pour le module de Young. A part la dureté Hv qui dépasse après traitement 550 Hv pour les quatre cas, les autres caractéristiques varient énormément surtout en fonction de la durée de maintien : à 05 min de maintien le module de Young chute à 73 GPa dans l'eau alors que dans l'huile la dureté Hv0,5 chute à 182 Hv et la pression d'indentation à 1966 HIT. Le traitement le plus adéquat pour cet acier est celui du maintien de 15 min, il donne les meilleurs résultats de dureté et de rigidité. Les caractéristiques étudiées obtenues par le refroidissement à l'huile sont légèrement meilleures que celles obtenues par refroidissement à l'eau.

Keywords: *dureté HIT, indentation, rigidité, microdureté, 100Cr6*

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REALISATION ET CARACTERISATION D'UN CAPTEUR CO2 A BASE DE NANOFILS DE SIC AMORPHE

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ABSTRACT

Ce travail, présente l'élaboration et caractérisation de nanofils de SiC amorphe (Nanowire Amorphous SiC, NWASC) pour une application d'un capteur de gaz (CO2). Les NWASC ont été préparées passant par deux étapes: la première, est la formation de nanofils de silicium (Silicon nanowire, SN) sur du silicium type p à faible résistivité qui est de l'ordre de 0.02 Wcm2, par attaque chimique assistée par un métal (Ag). La deuxième, est de déposer des couches minces de SiC amorphe hydrogéné, sur les nanofils de silicium élaborées, par pulvérisation cathodique RF magnétron, de différentes épaisseurs. Pour étudier les propriétés structurales et optiques de NWASC élaborées, différentes techniques de caractérisation tel que le microscope électronique à balayage (MEB), la spectroscopie infrarouge à transformée de Fourier (FTIR), et la photoluminescence (PL), ont été utilisées. Les résultats montrent la formation de NWASC avec une forte intensité de photoluminescence. En raison de sa grande surface spécifique et sa grande stabilité, les NWASC ont été utilisées comme dispositif de détection de gaz, tel que le CO_2. Enfin, d'après les résultats obtenus il a été constaté que la structure de NWASC présentait une performance de détection améliorée et extrêmement stable, et pourraient être prometteurs pour la construction d'un dispositif de conversion d'énergie.

Keywords: *nanofil de SiC amorphe, couches minces de SiC, Nanofils de silicium, capteur de gaz CO2.*

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IMPROVEMENT OF THE THERMAL PROPERTIES OF POLYPROPYLENE NANOCOMPOSITES BY THE VALORIZATION OF A LOCAL NANOCLAY

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ABSTRACT

The possibility of manufacturing nanocomposites materials with tailored properties at low cost has gained much interest. Particular interest has been paid to clay nano-platelets and their composites with non-polar thermoplastic polyolefin matrixes, namely polypropylene (PP). The goal of this work was to prepare a nanoclay, this last will be introduced during the preparation of nanocomposite based on the Polypropylene. Polypropylene / nanoclay nanocomposites have been prepared via a co-rotational twin screw extruder machine with nanoclay content varied between 0 and 11 Wt.%. The maleic anhydride grafted polypropylene (PP-g-MA) was used as compatibizer to improve the dispersibility of the nanoclay. The influence of nanoclay in a thermal properties of polypropylene nanocomposites have been studied. The obtained results indicate that the incorporation of a small amount of nanoclay has a significant effect on the thermal properties of nanocomposites. The nature and size of nanoclay directly affects the properties of nanocomposite.

Keywords: *Thermal stability., Nanoclay, Polypropylene, Nanomposites*

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SHAPE FACTOR OPTIMIZATION APPROACH FOR MODELING DIELECTRIC BEHAVIOR OF TERNARY MIXTURE

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ABSTRACT

The main objective of this paper is to study the dielectric behavior of a ternary composite using time domain reflectometry (TDR). This type of material is a heterogeneous mixture made of barium titanate (BaTiO3) and manganese dioxide (MnO2) in the same epoxy resin matrix (RE) maintained at a constant concentration level (70% by volume). While those of the other constituents (BaTiO3 and MnO2) are variable with step of 2.5% and completing each other in a way to achieve the remaining proportion, i.e. 30%. The samples of the composite are prepared at room temperature and under atmospheric pressure according to the stoichiometric ratios mentioned above. These combinations of mixtures are subjected to their dielectric behavior examination over a frequency wide band up to 5 GHz using time domain spectroscopy based on the discrete Fourier transform (DFT) measurement data retrieved from the TDR method. This investigation aims to highlight the effect of titanate and oxide on the dielectric behavior of the composite as well as on the shape factor provided by the modified Lichtenecker law. A numerical approach based on a better fitting of this factor is subjected to optimize the model of this predictive law and thus allowing a good agreement between theoretical and experimental results. A comparison between the Lichtenecker law and the modified Lichtenecker law is carried out in order to underline the performance of the resulting model on the dielectric behavior prediction quality of the ternary composite. This is achieved through the experimental assessment of the complex permittivity real part (ε) of different composite samples. This study interest lies on the application of these materials in microelectronics and particularly in telecommunication components manufacturing.

Keywords: *complex permittivity., shapes factor, composites, reflectometry, optimization*

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ANALYSE EXPÉRIMENTALE ET SIMULATION NUMÉRIQUE DU COMPORTEMENT DYNAMIQUE DES POUTRES SANDWICHS EN NID D'ABEILLE

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ABSTRACT

La performance de vibration des poutres sandwichs avec un noyau nid d'abeille hexagonal en aramide a été étudiée dans cet article. Une analyse modale expérimentale et numérique comparative de poutre sandwich en configuration encastré-libre a été utilisée pour prédire leurs caractéristiques de vibration (c'est-à-dire leurs fréquences propres et leurs formes de mode). La très bonne concordance entre les résultats montre que le modèle numérique est adéquat. De plus, il a été constaté que le paramètre de fréquence avait une sensibilité aux différents paramètres géométriques, à savoir la hauteur du cœur. Le résultat montre que le changement de hauteur du cœur a un impact plus important sur les fréquences propres de la poutre sandwich en nid d'abeille.

Keywords: *Analyse modale, Fréquence propre, Vibration libre, Hexagonal, Poutre sandwich*

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THE INFLUENCE OF SCALE EFFECT ON THE VIBRATION BEHAVIOR OF CERAMIC BASED NANO-BEAMS

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ABSTRACT

In this work, we study the effect of the small scale on the vibratory behavior of the nano-beam at the base of the ceramic using a new theory of the deformation of the exponential shears. The advantage of this theory is in fact taken into account of the influence of the transformation in shear. It is assumed that the material properties of the FG beams vary according to the distribution of the volume fraction of the constituents according to the exponential law. The motion equations are derived from the Hamilton principle. On the digital studies for the validation of the accuracy of the shearing theory. A parametric study will be presented to another parameter.

Keywords: *elastic foundation., free vibration, Hamilton principle, FG beam, shear deformation theory, Scale effect*

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HYDROTHERMAL SYNTHESIS OF ZNO/CQDS NANOCOMPOSITE WITH ENHANCED VISIBLE LIGHT PHOTOCATALYTIC PERFORMANCE

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ABSTRACT

ZnO/CQDs nanocomposite was synthesized with simple and green method. The morphological and chemical composition of the nanocomposites were characterized using X-ray photoelectron spectroscopy (XPS), Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (SEM). The optical properties of the nanocomposites were examined using UV-visible (UV-vis) spectrophotometry. The photocatalytic activity of the ZnO/CQDs was evaluated for the degradation of a model organic pollutant, rhodamine B, under visible light irradiation at room temperature. The obtained ZnO/CQDs nanocomposite showed excellent photocatalytic activity then that pure ZnO.

Keywords: *Rhodamine B, nanocomposite, CQDs, ZnO, Photocatalysis, Visible light*

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FIRST PRINCIPLE CALCULATIONS OF TERNARY ALLOY IN0.25GA0.75N

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ABSTRACT

In recent years, the development of III-V compounds has been spectacular whatever the fields of application considered (Microelectronics, energy, photovoltaic, optoelectronic, etc ...). The design and manufacture of new materials, often with surprising properties (special alloys, very light and very resistant composite materials, liquid crystals, semi-conductors, etc ...) is a very active field of research and modern technology. The ab- initio method of linearized augmented plane waves (FP-LAPW) implemented by the Wien2k code as part of the functional theory of density (DFT) was applied to study the structural, electronic properties of the ternary alloy InxGa1-xN based on the binary compounds GaN and InN. For the determination of the exchange and correlation potential, we used the approximation of the generalized gradient (GGA) to study structural, electronic properties are determined .To calculate the crystalline parameter and the energy gap of the ternary alloy InxGa1-xN we have adopted wurtzite super cells of 8 atoms, where the configuration chosen is the one minimizing the total energy.

Keywords: *electronic properties, Keywords: structural, DFT*

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MICROSTRUCTURE DE DEUX DIFFERENTES POUDRES TYPE AL2O3 OBTENUE PAR VOIE SOL-GEL

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ABSTRACT

L'alumine nanométrique est l'une des céramiques les plus importantes ayant des propriétés exceptionnelles telles que : haut point de fusion, la stabilité à haute température, une grande dureté, très résistant aux bases et aux acides. En raison de ses nombreuses propriétés on les trouve dans des applications diverses telles que matériaux de structure et fonctionnels hétérogène catalyseur ou support de catalyseur, abrasif et adsorbant, micro - électronique et des dispositifs médicaux comme la chirurgie des implants. L'objectif de ce travail est axé principalement sur l'élaboration des oxydes d'alumine sous forme de poudres. La synthétisation de ces oxydes a été réalisée par le procédé sol-gel modifiée. Ces derniers sont préparés à base de nitrates d'aluminium hydraté Al(NO3)3 9H2O On a utilisés deux procédés en parallèles aux mêmes conditions d'élaboration. Dans le premier l'acide citrique jeu le rôle du complexant en présence de l'éthylène glycol, par contre au deuxième protocole, nous avons dissous le précurseur de départ dans l'éthanol. Des analyses ATG et ATD ; FTIR ont été employées afin de déterminer les caractéristiques organiques et inorganiques des matériaux synthétisés ; telles que la décomposition de la phase organique et la formation des polycristalins à 1100 °C. Les microstructures et structure sont obtenues en utilisant le microscope électronique à balayage (MEB) et la diffraction X (DRX). Les résultats par Microscope électronique à balayage ont révélé des microstructures constituée de particules micrométriques; en forme d'aiguille et des plans de fracture irrégulier sur leur surface ; ou nanométrique de taille différente, (20 – 150 nm) typiques de matériaux soumis à un processus de fusion, puis par la suite à une réduction de la taille par broyage.

Keywords: *ATD, ATG, gel modifiée, Sol, Alumine, Microstructure .*

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ADSORPTION OF ACID DYE USING MODIFIED BENTONITES SORBENTS

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ABSTRACT

The bentonite clay comes from deposit M'zila (Mostaganeme, Algeria) is used as adsorbent in the raw form and modified to eliminate dyes as yellow bemacid E-4G in aqueous phase. Pillared clays with polycations of Aluminum, Iron and Chromium have been synthesized from natural bentonite using the solutions of AlCl3, FeCl3 and CrCl3 as pillaring agents. The resulting pillared bentonite has been characterized by X-ray diffraction (XRD), BET specific surface and infrared spectroscopy (FTIR). The d-spacing of P-Ben samples of Aluminum, Iron and Chromium is 14.7, 15.59 and 13.49…, respectively. The specific surface area founded of the pillars clay are 110, 119 and 77, 4 m2/g for Al, Fe and Cr, respectively. The results of E-4G dye adsorption showed that the maximum adsorption of modified bentonite was obtained at a range of pH 1-2. The maximum adsorption capacity was estimated to be 87.88; 61.39 and 60.03 mg/g for insertion of bentonite by Al, Fe and Cr, respectively at room temperature. The kinetic study of the adsorption of yellow day on the modified clays showed that equilibrium is reached after 60 min for the B-Al and 30 min for the B-Fe and B-Cr. A high adsorption performance was recorded for the following optimal conditions: at the temperature T = 25 °C.

Keywords: *adsorption, dyes., pillared clays*

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SYNTHESIS, CHARACTERIZATION AND ANTIBACTERIAL PROPERTIES OF BIOMATERIAL BASED ON SILVER AND GOLD NANOCOMPOSITE HYDROGEL

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ABSTRACT

Recently, the synthesis of metals nanoparticles has attracted considerable interest due to their different physical and mechanical properties of metal nano-sized particles from those of macroscopic materials. This Nanoparticles have found several applications in optical, electronic, medicine, cosmetic, and drug delivery. The silver nanoparticles (AgNP) and gold nanoparticles (AuNP) were extensively studied and used in medical devices especially as antibacterial agents. In this work, we present possible use of bionanocomposite hydrogels as templates to obtain metal nanostructures of different sizes. The hydrogels were synthesized via graft copolymerization of mixtures of acrylic acid (AA) and 2-hydroxyethyl methacrylate (HEMA) onto alginate backbones (Alg), in the presence of various loading levels of sodium montmorillonite (MMT). The nanoparticles were synthesized in situ within the network hydrogel using chemical reducing method, with AgNO3, HAuCl4 as a silver and gold precursor and NaBH4 as reducing agent. The bionanocomposite hydrogels were characterized by using UV-visible spectroscopy, thermo gravimetrical analysis, X-ray diffraction and transmission electron microscopy studies. Thermal and X-ray diffraction analysis confirmed the formation of nanoparticles in hydrogel. The results showed that the MMT displayed excellent characteristics in stabilizing and control size of nanoparticles. The nanocomposite hydrogels demonstrated good antibacterial effects against Escherichia coli and Staphylococcus aureus bacteria.

Keywords: *Antibacterial properties., Montmorillonite, Metal nanoparticles, Hydrogel, Bionanocomposite*

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CORRELATION BETWEEN CONDUCTIVITY AND OPTICAL PROPERTIES OF POLYCRYSTALLINE SILICON FILMS PREPARED BY LOW PRESSURE CHEMICAL VAPOR DEPOSITION

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ABSTRACT

The polycrystalline silicon layers deposited from thermal decomposition of silane (SiH4) by Low Pressure Chemical Vapor Deposition (LPCVD) technique at temperature 620Â°C, either undoped or diffusion phosphorus doped (5.38x1019 to 1.8x1020 cm-3), have been studied from optically and electrically point of view. The structures are composed of p-type -oriented monosilicon substrate, silicon oxide layer (100 nm) and polysilicon film (175 nm). Polysilicon layers were characterized by spectroscopic ellipsometry (SE) to determine the optical properties namely the refractive index (n) and extinction coefficient (k), in addition to the thickness (d). These parameters were determined from Î¨ ellipsometric angles analyses. The two sources of errors are instruments and sample model used for results deduction. A Cauchy layer model was used to compute the optical parameters in 450-900 nm wavelength range. The Hall Effect (HE) measurement was used to obtain the conductivity, mobility and free carrier concentration. This paper presents a new approach of the correlation between electrical conductivity and optical properties with different doping levels of polysilicon thin films. This approach suggests that there is a straightforward relation between theses properties allowing us to deduce electrical characteristics with a non-contact method. Â

Keywords: *Polysilicon, thin films, correlation, electrical conductivity, ellipsometry, Hall Effect*

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AMELIORATION DE LA SENSIBILITE D'UN CAPTEUR D'HUMIDITE A BASE DES NANOPARTICULES DE FERRITE DE BISMUTH PAR DES FIBRES DE CARBONE

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ABSTRACT

L'oxyde mixte de fer et de bismuth (BiFeO3) est l'un des matériaux les plus prometteurs pour des applications novatrices en raison de : son comportement antiferromagnétique à température ambiante, sa grande polarisation et sa grande stabilité électrique, thermique et structurelle, sa bande interdite (2,31 eV) qui lui confÈre des propriétés photocatalytiques trÈs intéressantes,...etc. Mais, vu sa grande résistance électrique, cet oxyde ne développe pas les propriétés souhaitées pour un capteur d'humidité. L'objectif de cette étude est l'amélioration des performances de détection d'humidité des nanoparticules de BiFeO3 par l'ajout des fibres de carbone. Les nanoparticules de BiFeO3 ont été élaborées par la méthode sol-gel et pour l'incorporation des fibres de carbone nous avons procédé par la méthode hydrothermale. Les poudres synthétisées ont été caractérisées de point de vu structurale par DRX, MEB and BET. Le comportement électrique des deux poudres BFO et BFO/FC vis-à-vis de l'humidité a été également étudié. Les mesures de capacité ont été effectuées à des taux d'humidité relative allant de 12 à 93% et la fréquence de travail est de 1kHZ. Les résultats ont mis en évidence l'adsorption des molécules de vapeur d'eau à la surface de nos couches sensibles. Les courbes d'adsorption et de désorption obtenues ont la mÃªme allure avec un faible taux d'hystérésis. Nous avons également estimé la sensibilité des deux capteurs, les résultats ont révélé que le capteur BFO/FC a donné une meilleure sensibilité (4293.83%) par rapport à celle du capteur à base de BiFeO3 (54.38%).

Keywords: *sensibilité, nanoparticules de BiFeO3, capteur d'humidité, capacité electrique*

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GREEN AND CLEAN ALUMINA SUPPORTED IRON CATALYSTS FOR BIGINELLI REACTION

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ABSTRACT

Heterogeneous catalytic systems usually exhibit high activity in organic reactions. Then, many studies have been reported concerning their preparation methods. The sol-gel technical is the most used one. It has been described by Pajonk for its several advantages such as a well-defined pore size distribution, high purity control of reactants, homogeneity, high thermal stability.... This latest method may use a variety of supports rather than alumina and silica. The aim of this present study is the synthesis by sol gel method of alumina supported iron catalyst, noted (Fe/Al2O3-SG) and the investigation of its textural and structural parameters (surface parameters (BET), morphology (SEM), composition (XRD)) and the evaluation of its catalytic activity in the Biginneli reaction to obtain 5-ethoxycarbonyl-4-phenyl-6-methyl-3,4-dihydropyridin-2(1H)-one known by the DHPM acronym. The reaction was performed under solvent free conditions with a ratio of 2:2:3 of benzaldehyde, ethylacetoacetate, and urea, respectively. The as prepared system seems to be efficient for this reaction, it gives well performance around 61% of DHPM yield after only 1 hour reaction time.

Keywords: *iron, catalysis, gel method, Sol, Biginelli reaction.*

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ÉTUDE DE L'EFFET DU BROYAGE SUR LA DENSIFICATION ET LES PROPRIÉTÉS ÉLÉCTRIQUES DU MATÉRIAU CÉRAMIQUE SANS PLOMB DE TYPE [(NA0.535 K 0.480) 0.966 LI0.058](NB0.90TA 0.10)O3 ÉLÉBORÉ PAR VOIE SOL GEL

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ABSTRACT

Les matériaux ferroélectriques les plus utilisés sont des matériaux à base de plomb, avec en particulier la famille phare des PZT. Des législations ont été mises en place dans le but de limiter les substances toxiques. Parmi les éléments visés figurent notamment les métaux lourds (Pb, Cd,...), tel que le plomb dont la toxicité n'est plus à démontrer. Dans cette étude nous avons élaboré des poudres de type [(Na0.535 K 0.480) 0.966 Li0.058](Nb0.90Ta 0.10)O3 nommé NKLNTpar voie sol gel. La chamotte obtenue par cette méthode est fortement agglomérée, pour cela nous avons envisagé de la broyer avec broyeur planétaire et d'étudier l'effet du broyage. Les caractérisations par impédance méterie et par piézométrie des céramiques issues de la chamotte NKLNT broyée et frittées à 1100°C montrent que ces derniers présentent de bonnes propriétés diélectriques (er=7495et tand=0.04), ferroélectriques avec un Pr de 32 µC/cm2 et piézoélectriques avec un d33 de 127pC/N. Et nous avons mis en évidence les bienfaits apportés par le broyage de la chamotte sur la densification ; on note une augmentation du taux de densification de 89 %, pour une céramique issue d'une chamotte non broyée, à 96 % d'environ pour une céramique issue d'une poudre broyée pendant 3 heures.

Keywords: *pérovskite, sol gel, Matériaux pour l'environnement, diélectrique, piézoélectrique*

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SYNTHÈSE ET CARACTÉRISATION DES NANOCOMPOSITE DE BIFEO3, APPLICATION A LA DETECTION DE L'ÉTHANOL

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ABSTRACT

La pérovskite BiFeO3 est connue comme étant un matériau multiferroïque qui présente des propriétés intéressantes telles que les propriétés magnétiques, optiques, photo-catalytiques. La stabilité thermique et structurale, de plus la présence des sites vacants en oxygène, induits par le rapport non-stœchiométrique, rend la ferrite de bismuth comme un candidat prometteur pour la détection de gaz. Ces dernières années les matériaux à base de carbone ont envahie le domaine des capteurs, cela en raison de leurs propriétés physique et chimique hors du commun : grande surface spécifique et conductivité électrique élevée, ce qui les places comme des bons candidats pour améliorer les propriétés de détections des capteurs à base d'oxydes métalliques. Dans ce travail, nous avons préparé des nanocomposites hybrides (BFO/fC) en mélangeant différentes quantités de fibres de carbone avec des nanoparticules de BiFeO3 synthétisées par voie sol-gel. Les nanocomposites ont été caractérisées par diffraction des rayons X (XRD), microscopie électronique à balayage (SEM), spectroscopie Raman, et infrarouge (FT-IR), et la mesure de surface spécifique par la méthode (BET). L'étude des performances de détection de l'éthanol a été réalisée sous un régime statique dans la gamme des concentrations de 100-1000 ppm à différentes températures. Les résultats obtenus montrent que la sensibilité de BiFeO3 est améliorée avec l'ajout de charges de fibre de carbone.

Keywords: *Capteurs de gaz., Fibre de carbone, BiFeO3*

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DESIGN OF MULTI-BAND GAP ABSORBER LAYER FOR SINGLE-JUNCTION A-SI:H SOLAR CELL

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ABSTRACT

In p-i-n amorphous silicon solar cell, the intrinsic layer turns out to play a crucial role in optimizing the performance of solar cell. In this study, an intrinsic layer based on multi-band gap by using a-Si:H alloys for single junction solar cell have been studied. Generally, amorphous silicon-based solar cells used wide band gap absorber layer for high voltage and narrow band gap absorber for high current. The technique of multi-gap aim to increase the use of the light in the absorber layer, hence each sub-layer in absorber layer uses a certain part of the spectrum of solar radiation for the production of electric current. In this context, a numerical simulation was carried out by using wxAMPS simulator. The properties of different sub-layer of absorber layer were optimized to obtain maximum conversion efficiency. Indeed, the use of absorber layer based on multi-gap can control the spectral overlap. The initial conversion efficiency of single-junction solar cell reaches to 12.6%.

Keywords: *aSi:H alloys, Multiband gap, aSi:H Solar Cell, Absorber layer*

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SYNTHESIS AND CHARACTERIZATION OF POLY (VINYL ALCOHOL)/SILICA NANO-TITANIUM DIOXIDE (PVA/SiO_2-TiO_2) HYBRID NANOCOMPOSITES FILMS PREPARED BY SOL-GEL METHOD: EFFECT OF NANO-TiO_2 ON THE PROPERTIES OF SILICA/POLYVINYL ALCOHOL BLEND FILMS

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ABSTRACT

This research is focused on preparation and characterization of poly (vinyl alcohol)/silica/Nano TiO_2 and the effect of TiO_2 Nano-particles (from 1 to 5%) on the properties of poly (vinyl alcohol)/silica films prepared by a sol-gel method using poly (vinyl alcohol) powder and the Tetraethyl orthosilicate (TEOS) as the precursor sources of silica. (TEOS) was hydrolyzed and condensed in water and ethanol under the action of the acid catalyst (HCL). The hybrid films were characterized by Fourier transform infrared (FT-IR), Attenuated Total Reflection (ATR) Water absorption, Water contact angle, Ultraviolet Visible Spectrometry (UV-Vis) and (Thermo-gravimetric Analysis) TGA. The PVA/SiO_2/Nano-TiO_2 hybrid films were successfully synthesized. FT-IR results confirmed that PVA had been linked with (SiO_2) network by chemical bonds. UV-Vis measurements confirmed that the shieling properties to Ultraviolet (UV) were greatly improved with Nano-titanium dioxide filled in the hybrid films. TGA measurements suggested that the hybrid films show better resistance to heat than pure PVA films. The results of water contact angle indicated that Nano-TiO_2 as a dopant had a significant effect on the hydrophilicity property of PVA/SiO2 films. The water resistance of the films was also improved.

Keywords: *hybrid films, TiO2, Nano, PVA, gel method, sol, Characterization.*

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NUMERICAL STUDY OF FORCED CONVECTIVE NANO FLUID IN A HORIZONTAL CHANNEL WITH ELECTRONIC COMPONENT

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ABSTRACT

Previous work has shown that durability of electronic component can be improved significantly by operating the device with reasonable temperature below than 85 °C. In many cases, it is important to modify the physical characteristics of the fluid used as coolant. In recent years, nano particles dispersed in base fluid demonstrate an enhancement in heat transfer transport phenomena. The present work examines the combination of two methods: an active one (pulsation of the fluid at the entrance of the channel) and a passive one (the addition of the Al_2O_3 nano particles in the base fluid). The physical system under consideration is a horizontal channel of height H and length L=40—H with nine identical rectangular blocks (electronic components) spaced uniformly on the bottom wall. The height of the heater to height of the channel ratio was set at h/H=0.5. The length-to-height ratio of the block was fixed at l/h=2. Inlet and outlet lengths of Lin/H=11 and Lout/H=12. The finite volume method has been used to solve the governing equations with different flow parameters. Two cases are considered in this work: uniform and pulsed inlet flow of nano fluid. The results show that the flow is instable for critical Reynolds number and critical frequencies. The enhanced heat transfer is calculated as ratio of Nusselt number of pulsation flow by the Nusselt number of uniform flow. An enhanced heat transfer ratio for each electronic component has to be found within a large band of frequencies and volume fraction of nano particles. The temperature of each electronic component has been defined with different particles concentration (5 %, 10 % and 15%) and different Reynolds number. The temperatures values are sensitive with nanoparticles concentration.

Keywords: *Reynolds number, horizontal channel, forced convection, Nano fluid*

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CHEMICAL POLYMERIZATION, CHARACTERIZATION AND ELECTROCHEMICAL STUDIES OF PANI/ZNO DOPED WITH HYDROCHLORIC ACID AND/OR ZINC CHLORIDE: DIFFERENCES BETWEEN THE SYNTHESIZED NANOCOMPOSITES

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ABSTRACT

This An in-situ polymerization method has been employed to prepare HCl-doped polyaniline (PANI)/ZnO nanocomposites and (HCl-ZnCl2) doped PANI/ZnO. Structural characteristics were investigated by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), ultraviolet spectroscopy (UV), thermogravimetric analysis (TGA) and Transmission Electron Micrographs (TEM). TGA results showed that the decomposition of the HCl doped PANI/ZnO nanocomposites was less than that of (HCl-ZnCl2) doped PANI/ZnO nanocompositess. Conduction studies were done by using four-probe method. Electrical conductivity study shows an increase in the conductivity of the samples with the (HCl-ZnCl2) doped) PANI/ZnO to 0.081 S.cm-1. To further explore the advantages of these nanocomposites for real applications, we investigated the electrochemical properties of these samples electrodes, the (HCl-ZnCl2-doped) PANI/ZnO nanocomposite presented much higher electrochemical response to (HCl doped) PANI/ZnO and (ZnCl2-doped) PANI/ZnO nanocomposites.

Keywords: *Nanocomposites, Aniline, Zinc Oxide, Zinc Chloride, Electrochemical properties.*

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EFFECTS OF RARE EARTH (CE, ER, EU) DOPING ON STRUCTURAL AND OPTICAL PROPERTIES OF ZNO AEROGELS SYNTHESIZED IN SUPERCRITICAL ISOPROPANOL

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ABSTRACT

Pure and rare earth (Ce, Er and Eu) doped ZnO aerogels have been synthesized by the sol-gel method followed by supercritical drying in isopropanol. The rare earth (RE) atomic concentration in each aerogel is fixed to 3 at. % ([RE]/[Zn]= 0.03). Zinc acetate dihydrate , rare earth nitrates (Ce, Er and Eu) and methanol were used as Zn2+ ions precursor, rare earth (Ce3+, Er3+ and Eu3+) ions source and solvent, respectively. The as-prepared aerogels were investigated using X-ray diffraction (XRD), attenuated total reflectance infrared spectroscopy (ATR-IR),UV-visible and photoluminescence (PL) spectroscopy. XRD measurements revealed that the obtained aerogels have polycrystalline ZnO hexagonal wurtzite structure and showed that the RE ions have been introduced in ZnO lattice. Also, It has been observed that RE-doping deteriorates the crystal quality and slightly changes the lattice parameters of the ZnO aerogels. ATR-IR spectra showed the high purity of the elaborated aerogels and the intensity of the absorption band related to Zn-O vibration bond is found to be dependent on the RE ions . UV-Visible spectra show that pure and RE-doped ZnO crystallites elaborated in supercritical isopropanol do not absorb in the same way due to the various stoichiometric variations of defects created during the elaboration process. It has been found RE-doping significantly enhances the optical absorption band related to band-to-band absorption. PL spectra show that the concentration of free excitons strongly depends on the RE doping element. The PL measurements demonstrate that RE doping decreases the UV emission and increases the visible one, indicating an increase in the defects concentration localized in the band gap. The intense UV emission is found in pure ZnO aerogel, however, the visible one is found to be the largest and dominant in Ce-doped ZnO crystallites elaborated in supercritical isopropanol.

Keywords: *DRX, Rare earth doping, supercritical isopropanol, ZnO aerogel, photoluminescence .*

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VISCOELASTICITY THEORY FOR BENDING ANALYSIS OF FG NANO-PLATE

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ABSTRACT

In this study, the bending analysis of nano plate made of functionally graded material is investigated .Where the plate has been modeled as a viscoelastic element. . The nonlocal governing equations for a viscoelastic nano FG-plate are derived through Hamilton's' principle and they are solved applying the Navier solution. Different parameters are considered in order to validate its effect on the response of the plate in terms of its natural frequency. According to the numerical results, it is confirmed that the proposed modeling can provide accurate frequency results for FG nano-plate as compared to some cases in the literature. This approach can serve as a benchmark against which other semi analytical and numerical methods based on classical plate theories can be compared.

Keywords: *non local, FGM, plate, viscoelastic behavior*

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SYNTHESIS AND CHARACTERISATION OF DIFFERENT BLENDS OF VIRGIN POLYETHYLENE MODIFIED BY NATUREL FIBRES ALFA

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ABSTRACT

The basic idea of this study is to promote a polyethylene recycle and local vegetable fiber (alfa) in the development and characterization of a new composite material. In this work, different size of fiber alfa (<63 microns, between 63 and 125 microns, 125 and 250 microns) were incorporated into the blends (HDPE / recycled HDPE) with different methods elaboration (extruder twin-screw and twin-cylinder mixer). The fiber was modified by sodium hydroxide in order to evaluate the effect of alkaline treatment on the interfacial adhesion and therefore the properties of composites prepared. These were characterized by various techniques: mechanical (tensile and Charpy impact test), Rheological (melt flow), morphological (SEM). The demonstration of the effect of alkali treatment on alfa fiber was examined by FTIR spectroscopy and morphological analysis. The introduction of alfa treated fiber in the (HDPE / recycled HDPE) increased stress, impact strength and Young's modulus on the contrary, the elongation at break decreases. The results of the mechanical properties showed an improvement is better in extrusion twin-screw mixer than two cylinders.

Keywords: *Polyethylene, Blends, Recycling, Alfa, Naturel fiber*

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INFLUENCE DE LA TEMPERATURE DE FRITTAGE SUR LES PROPRIETES DIELECTRIQUES, FERROELECTRIQUES ET PIEZOELECTRIQUES DU MATERIAU CERAMIQUE DE COMPOSITION (NA0,5 BI0,5)0,94 BA0,06 TIO3

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ABSTRACT

Le titanate de bismuth et de sodium Na0,5 Bi0,5 TiO_3 est un matériau piézoélectrique sans plomb qui a fait l'objet d'un grand nombre de travaux de recherche en raison de ses propriétés diélectriques intéressantes. Des études antérieures ont montré que Na0,5 Bi0,5 TiO_3 forme des solutions solides avec d'autre composés de structure pérovskite par la substitution sur le site A. La substitution de Na0,5 Bi0,5 TiO_3 par $BaTiO_3$ a permis d'obtenir des propriétés diélectriques et piézoélectriques performantes. Dans cette étude, nous avons choisis d'élaborer un matériau céramique sans plomb de composition (Na0,5Bi0,5)0,94Ba0,06TiO_3 par voie solide. La poudre synthétisée et les céramiques élaborées ont été caractérisées par diffraction des rayons X (DRX) et par microscopie électronique Ã balayage (MEB). L'influence de la température de frittage sur la microstructure, les propriétés diélectriques, ferroélectriques et piézoélectriques de ce matériau a été aussi étudiée. Les résultats obtenus, montrent que le matériau fritté à 1150°C/2h présente une densité élevée de l'ordre de 5,85 g/cm3, avec de bonnes propriétés diélectriques (Æ • > 1500 et tgÎ´< 0,085), ferroélectriques (Pr = 7,27 µC/cm^2) et un bon coefficient piézoélectrique (d33 = 90 pC/N). Le matériau céramique piézoélectrique de composition (Na0,5 Bi0,5)0,94 Ba0,06 TiO_3 est un bon candidat pour des applications dans différents dispositifs piézoélectriques sans plomb.

Keywords: *Na0, 5 Bi0, 5 TiO3, matériau piézoélectrique sans plomb, diélectrique, ferroélectrique*

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COMPARATIVE INVESTIGATION ON MECHANICAL AND RELEASE PROPERTIES OF BINARY PBAT/ZNO AND TERNARY PBAT/ZNO/C30B NANOCOMPOSITES FILMS

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ABSTRACT

Ternary PBAT/ZnO/C30B and binary PBAT/ZnO nanocomposites films with different weight ratio (2% ,3 % and 5% of ZnO) were appropriately elaborated by solvent cast process and characterized by several techniques.In order to highlight the effect of the 3% Cloisite 30B addition on the PBAT/ZnO matrices, the properties of the obtained films were compared. The results of UV-VIS spectroscopy confirmed the existence of nano loads of 30 nm within the PBAT matrix. Also, FTIR analysis of PBAT/ZnO/C30B was investigated in order to bring out the interactions between the polymeric matrix, ZnO and C30B constituents. Nanoindentation measurements of binary and ternary nanobiocomposites films showed an improvement of elongation and hardness modulus of ternary PBAT/ZnO/C30B compared to binary PBAT/ZnO films . The follow-up of the Zn2+ ions release revealed a delay in the release of Zn2 + ions for the PBAT/ZnO/C30B films due to the interactions between ZnO oxygen atoms and the cloisite 30B's OH groups.

Keywords: *nanocomposite,....*

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STUDY OF THE PHOTOCATALYTIC DEGRADATION OF ORGANIC POLLUTANTS USING TWO TYPES OF TITANIUM DIOXIDE-BASED CATALYST

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ABSTRACT

Colored discards pose an environmental problem because they can be toxic, not biodegradable and resistant to destruction by physicochemical treatment methods. For this type of pollutants, it is necessary to find an effective method for their elimination of waste water from textile effluents. The Heterogeneous photocatalysis, currently in vogue, appears as an alternative technology; indeed, it allows the destruction of organic pollutants, such as dyes, while leading to complete mineralization. this work presents the preparation of titanium dioxide by the sol-gel in the presence of polyethylene glycol with a molecular weight of 200g mol-1 (PEG200) crystallized after treatment with hot water at a temperature 90°C. The structure, particle size and internal surface of PEG200 nanoparticles were characterized by X-ray diffraction (XRD) and Raman spectroscopy. before studying and comparing the photocatalytic degradation of orange methyl in the presence of two semiconductors: titanium dioxide prepared by the sol gel method in the presence of PEG 200 and Degusa P25 by UV irradiation at 365 nm.

Keywords: *Nanocrystalline titania, Sol, gel, Photocatalysis, Decolourization, Dye*

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STRUCTURAL AND OPTICAL PROPERTIES STUDY OF ZNO NANOCOMPOSITES ELECTRODEPOSITED ON POROUS SILICON SUBSTRATES

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ABSTRACT

ZnO films deposited on silicon porous substrates (PS) were prepared by electro-deposition anodization on n type (100) silicon wafer. This ZnO/PS structure combines substrates having specific structural and optical properties (IR emission), with nano-composites of ZnO potentially interesting due to their functional properties (UV emission) to be integrated as constitutive elements of devices in various optoelectronic applications mainly in blue light emitters.With this combined structure, the blue shift in the PL peak is possible and easy to obtain (467nm). the structural properties characterized by X-ray diffraction (DRX) and scanning electronic microscopy (MEB).Our objective is the improvement of the optical properties of our ZnO/PS structure by the combination the optical properties of porous silicon with those of zinc oxide which has wide applications for example UV and blue emitters. Our ZnO nanocomposites were successfully deposited on PS substrates. These nanostructures were prepared by electrodeposition technique using ZnCl2 and the KCl under optimized conditions. This technique has some advantages compared to the physical deposition techniques. By this combine the photoluminescence (PL) of ZnO/PS increased and covered the most of the visible spectra. MEB images shows clearly that the ZnO particles entered in the pores of porous silicon despite the fact that few pores of PS were not covered completely by the ZnO particles. In other words, with the high porosity and the low dimension of the PS layer structure may be increase the photoluminescence (PL), the blue shift in the PL peak is possible and easy to obtain.

Keywords: *Electrochemical deposition, Nano composites ZnO, Porous silicon.*

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PREPARATION AND SWELLING BEHAVIOR OF NANOCOMPOSITE BIOFILMS ALGINATE DE SODIUM / KAOLINITE

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ABSTRACT

The technology of polymer composites reinforced with natural fillers is focused on creating a material with improved properties at low cost and easy removal .The reinforcements of the polymer matrix can have either organic or mineral origin. The mineral nano-fillers belong to the family of phyllosilicates such as kaolinite, characterized by the successive stacking of the octahedral (O) and tetrahedral (T) layers. clays are recognized to get several beneficial variations on stiffness, hardness, toughness and heat resistance The swelling behavior and the adsorption properties of kaolinite can be optimized, and adapted to the intended uses. Alginate is a biocompatible, non-toxic, non-immunogenic and biodegradable polymer. It is a naturally derived linear polysaccharide comprised of a -D-mannuronic acid (M block) and a-L-guluronic acid (G block) units arranged in blocks rich in G units or M units, separated by blocks of alternating G and M units.In order to improve the nanocomposite materials we have prepared nanocomposite AlginateNa / modified kaolinite clay biofilms, then we studied the swelling of the membranes at different ratios in distilled water and NaCl at 0.9%. Membranes are characterized by FTIR analysis to study functional group changes; DSC for measuring thermal transitions of bio-composite films, including crystallization and melting temperatures (Tc and Tm).

Keywords: *inorganic filler, Kaolinite, Alginate de sodium, Membranes, nanocomposite, swelling*

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ASPECTS BIOPHYSIQUES DES VAISSEAUX SANGUINS : CAS DE LA STABILITÉ DES ARTÈRES

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ABSTRACT

Le présent travail porte sur l'aspect biophysique des vaisseaux sanguins ; en l'occurrence le cas de la stabilité des artères. Cette stabilité sous des charges de pression engendrées par la circulation du sang est essentielle pour maintenir la fonction normale et régulière des artères. En revanche l'instabilité de ces éléments peut engendrer des complications cliniques graves et significatives. L'utilisation de la théorie de l'élasticité et les équations physiques du flambement ont été développées en prenant en compte aussi la pression critique du flambement et le module de Young, le rayon des artères et leurs longueurs, l'épaisseur de la paroi et la déformation axiale. Les résultats montrent que les artères peuvent flamber et devenir tortueuses à cause de plusieurs facteurs qui sont : la réduction de la déformation axiale, la pression activée et la fragilité des parois.

Keywords: *flambement., artÈres, biophysique*

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NONLOCAL ELASTICITY EFFECT ON VIBRATION CHARACTERISTICS OF PROTEIN MICROTUBULES

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ABSTRACT

For various cellular functions of microtubules (MTs), vibration of microtubules is one of the issues of major concern. In this paper, the vibration characteristics of protein microtubules (MTs) are examined based on a nonlocal Timoshenko beam model and using the wave propagation approach. The small scale effect on MTs wave propagation dispersion relation is explicitly revealed for different MTs wave numbers by theoretical analyses and numerical simulations. The research work reveals the significance of the effects of small scale, transverse shear deformation and rotary inertia on vibrations characteristics of protein microtubules. It is believed that the present model offers a simple and effective new approach to studying vibration characteristics of microtubules.

Keywords: *vibration, microtubules, cell mechanics, nonlocal elasticity theory.*

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SYNTHESE AND CHARACTERIZATION OF PVA-G-AA-POLYY(AA-CO-AMPS) / MMT SUPERABSORBENTHYDROGEL

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ABSTRACT

Hydrogels represent tridimensional networks of hydrophilic polymers, which are able to swell in water and other biological fluids. A superabsorbant is defined as a material, which swells over 95% of the hydrogel composition [1] .The ability to swell in water depends firstly on the type of polymers and on the degree of crosslinking. [2] [3].The polymers studied in this research are poly(vinyl alcohol) (PVA) and poly(acrylic acid) (PAA), a neutral and an ionic polymer, respectively. The two polymers were selected because the combination of their individual characteristics helps to create a hydrogel that is desirable for pharmaceutical and biomedical processes. Also, the two polymers are miscible with each other and can be prepared in aqueous solution, composites derived from AMPS always exhibit independent swelling behaviors from pH values.Nanocomposites exhibit improved or even novel properties when compared to micro- and macro-composites. Strong interfacial interactions between the dispersed clay layers and the polymer matrix lead to enhanced mechanical, thermal and barrier properties of the virgin polymer Montmorillonite (MMT) is a layered aluminum silicate with exchangeable cations and reactive–OH groups on the surface. It is one of the most widely used layered silicates because its lamellar elements display high inplane strength, stiffness, and high aspect ratioSuperabsorbents were synthesized by graft copolymerization of acrylic acid (AA)) and 2-acrylamido-2-methyl-1-propanesulfonic acid (AMPS) onto poly(vinyl acohol) (PVA) and montmorillonite (MMT) by using potassium persulfate (KPS) as a free radical initiator, in the presence of N,N-methylenebisacrylamide (MBA) as a crosslinking agent. The structure and morphologies of the superabsorbents were characterized by Fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA) and scanning electron microscope (SEM). Superabsorbent comprised a porous crosslink structure of MMT and PVA with side chains that carry carboxylate, carboxamide and sulfate.

Keywords: *propanesulfonic acide, 1, methyl, 2, acrylamido, 2, acrylic acid, Superabsorbent, Montmorillonite, poly(vinyl acohol) .*

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IMPROVED ANALYSIS TO CALCULATE INTERFACIAL STRESSES IN PLATED TIMOSHENKO BEAM SUJECTED TO ARBITRARY LOADING

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ABSTRACT

Reinforced concrete, steel or timber beams bonded with fiber reinforced polymer (FRP) plates to their tensile faces, is popular method for retrofitting and rehabilitation in civil structural engineering. The major disadvantage of this technique is the peeling of the FRP plates from the concrete which is due to the high level of stress concentration in the adhesive at the ends of the FRP plate, and as a result, a debonding phenomenon develops at this position and may produce a sudden failure of the structure. In this paper, a new simple and rigorous analytical solution to calculate interfacial stresses in plated Timoshenko beam, based on equilibrium equations, is presented for simply supported beam bonded with a thin plate. This method avoids the coupling of differential equations of interfacial stresses and presents less complex solutions of the interfacial stresses than those presented until now .This new solution is intended for application to beams made of all kinds of materials bonded with a thin plate. Finally, the numerical comparisons between the existing solutions and the new current solution allow a clear appreciation of the shear deformation effects based on the theory of the Timoshenko beam.

Keywords: *retrofitting, peeling, FRP, Reinforced concrete, Timoshenko beam, thin plate*

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SYNTHESIS AND CHARACTERIZATION OF A PHOSPHATE GLASS-CLAY COMPOSITE

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ABSTRACT

The confinement of complex radioactive waste solutions is an issue. The aim of this study is to synthesize a phosphate glass doped with a complex radioactive solution associated to a clay material. The phosphate glass dopedwith a radioactive waste solution is mixed with 20% of clay. This composite is synthesized by calcination at 850Â°C with a very slow heating step in order to avoid an earlier glass melt. The resulting composite ischaracterized by X-ray diffraction, infrared spectroscopy Fourier Transform and Raman spectroscopy. The final product includes a phosphate glass and four crystalline phases, namely: (NaFe (P2O7), AlCs3P2and AlPO4, phosphates and (Si0.98Ti0.02)O2silicate. Cesium element appears to be confined in AlCs3P2phosphate. FTIR analysis reveals the presence of both PO43-and P2O74-units absorption bands (1120, 1097 and 1018 cm-1), and P-O-P vibrations associated to the amorphous phase (900 and 945 cm-1). The deformation of P2O74- units and PO43- ion also appears in weak lines at 800 to 400cm-1.

Keywords: *clay material, mixed oxide, Glass iron phosphate, FTIR, XRD*

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SYNTHESES AND MODIFICATIONS OF HYBRID MESOPOROUS MATERIALS: APPLICATION TO THE DEPOLLUTION OF WASTEWATER OF PHARMACEUTICAL INDUSTRIES AND HOSPITAL DISCHARGES

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ABSTRACT

The contamination of water by pollutants of various origins is a current problem; in hospitals and the pharmaceutical industry in particular, wastewater is one of the most important sources of pollution of surface water and groundwater. Thus, it is necessary to treat these discharges before they are discharged into the sewerage system. Many techniques exist of which the adsorption is part and it is the most used, with several adsorbents such as activated carbon, clays, zeolites and especially the mesoporous materials that have been used in aqueous medium, for the adsorption organic and inorganic pollutants. For our part, we first synthesized a hexagonal material (MCM-41), which was modified with organic groups. The groups will then be extracted selectively and finally their calcination. The various materials obtained have been characterized using the following techniques: DRX, IRTF, BET, ATG / ATD, MEB / MET and Zetametry. In the second step, the application of the adsorption of various organic pollutants (Ibuprofen, Diclofenac, ...) was investigated. The adsorption of these pollutants is based on the evaluation of the influence of the reaction parameters such as the mass of adsorbent, the stirring speed, and many others on the yield, before proceeding to the study of the different kinetic and isothermal models. The kinetic models of pseudo-first, pseudo-second order, and intraparticlar diffusion have been studied; Freundlich, Langmuir, and Sips models have been proposed for the modeling of adsorption isotherms. he results obtained during the adsorption study demonstrate that the different materials synthesized, will have a significant adsorption capacity on a wide variety of pharmaceutical residues and that this capacity is better in complex solutions and especially so to postulate that the materials selected may be an effective solution for purifying aqueous media contaminated with pharmaceuticals.

Keywords: *wastewater treatments., pharmaceutical residues, adsorption, functionalization, 41, MCM*

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INTERCALATED CLAY/CONJUGATED POLYMERS NANOCOMPOSITES THROUGH TANDEM DIAZONIUM CATION EXCHANGE REACTIONS AND IN-SITU PHOTOPOLYMERIZATION

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ABSTRACT

In this work, we describe a simple method to make clay/polymer nanocomposites through tandem diazonium salt interface chemistry and photopolymerization. Before we synthesize the nanocomposite using benzophenone as an initiator, the sodium Montmorillonite (Mag-Na+) was ion exchanged with N,N'-dimethylbenzenediazonium cation (DMA) from the tetrafluoroborate salt precursor (BF4â˜), which will act as a hydrogen donor thus allowing the photopolymerization, these inexpensive, recyclable and ecological ctalysts have shown their effectiveness in several nanocomposites synthesis and bifunctional catalytic properties for diazotization and diazo coupling reactions, the resulting nanocomposites were fully characterized using FT-IR which has shown that the polymerization has been carried out. In addition, UV-vis measurements indicate the presence of conjugation of the synthesized polymers. Moreover, XPS have certified that the clay has undergone a cationic exchange of sodium by the diazonium salt, and that the P2-AT polymer and the P(2-AT-co-Py) copolymer are present in large quantities on the surface of the nanocomposite. Furthermore, X-Ray diffraction spectra exhibited a significant increase of the clay interlayer space distance of nanocomposites compared to that of the raw clay, these analyzes allowed us to propose a radical polymerization mechanism.

Keywords: *copolymerization, conducting polymers, photopolymerization, nanocomposites, clay.*

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SYNTHESIS AND CHARACTERIZATION OF BIOPOLYMERS-CLAY NANOCOMPOSITES BY IN-SITU PHOTOPOLYMERIZATION METHOD USING ORGANIC MODIFIED CLAY

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ABSTRACT

Biodegradable polymer nanocomposites have attracted considerable attention from researchers and industry. From these nanocomposites, poly (lactic acid) (PLA) and Poly(caprolactone) (PCL) were extensively exploited in biomedical field. In this paper we report the use of 4-N,NdiMeaminobenzenediazonium salt grafted to monmorillonite Na+, used like hydrogen donnor in radical photopolymerization of monomers lactic acid (LA) and Æ•-caprolactone(CL). The sample obtained was characterized by IR, UV, DRX, RMN, TGA and DSC.

Keywords: *biopolymers, clay, Cloisite Na+, photopolymerisation, nanocomposites, PLA, PCL*

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CHEMICAL OXIDATIVE POLYMERIZATION OF PANI-SR FLEXIBLE THIN FILM FOR AMMONIA DETECTION

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ABSTRACT

Ammonia is a very toxic gas noxious for human health and environment. In this case, a flexible film ammonia sensing could be a real solution for the healthy protection. The present work focuses on the ammonia gas sensing based on conducting polymer-metal nanocomposites. Polyaniline-strontium (PANI-Sr) thin films nanocomposites were successfully obtained via an in situ facile chemical oxidative polymerization of aniline in presence of strontium nitrate (SrNO3) deposited on biaxially oriented polyethylene terephthalate (BOPET) flexible substrates, with prior surface treatment using (3-aminopropyl) trimethoxysilane aiming to enhancing the film adhesion and reaching a specific morphology for the polymeric chains of PANI. Spectroscopy and morphological characterizations were carried out using fourier transform infrared spectroscopy (FTIR-ATR), RAMAN spectroscopy and scanning electron microscopy (SEM). The electrical conductivity study was measured by the usual four probes technique. Noticeably, the prepared films have shown an increase in the conductivity of the samples with SrNO3 to 1.49 Ã—104 S.cm-1. This high conductivity has been exploited to test the sensitivity and the performances of the obtained films toward different type of gas and vapors. The PANI-Sr sensor demonstrates an excellent selectivity and sensitivity to the ammonia gas over the other tested vapors at room temperature within a limit detection of 5ppm.

Keywords: *Strontium thin film, polyaniline, gas sensors, ammonia*

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PHOTOCATALYTIC PROPERTIES OF NANOCRYSTALLINE TiO_2 THIN FILMS PREPARED BY SOL-GEL METHOD

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ABSTRACT

Titanium dioxide (TiO_2) thin films are extensively studied because of their interesting chemical, electrical and optical properties (high band-gap, transparent in the visible range, high refractive index, high dielectric constant, and ability to be easily doped with active ions; which are considered for various optical applications such as photocatalysts, planar waveguides, gas sensors, antireflective coating. The aim of this work this is to evaluate the photocatalytic activities of nanocristallins of titanium dioxide for the decolorization of methylene blue aqueous solution (MB) as a model organic contaminant under UV irradiation. The nanocristallins TiO_2 thin films were prepared on glass substrate using a sol-gel dip-coating technique; the samples were calcined in air 500°C for 2 hours. The structure and optical properties have been investigated by X-ray diffraction (XRD), Raman spectroscopy, UV-Visible, atomic force microscopy. The crystalline structure of TiO_2 films was dominantly identified as the anatase phase, consisted of uniform spherical particles of about 20 nm in size, characterisation by Raman spectroscopy confirmed that the anatase crystal type was retained and present in all simples. The optical spectroscopy measurements show that the films are fully transparent in the visible region. The prepared TiO_2 photo-catalyst films exhibited excellent photo-catalytic ability for the degradation of methylene blue under visible light irradiation. The relative amount of MB removed by the TiO_2 photocatalyst is 42% within 1 hours of irradiation. With increasing the time, the MB degradation continues to increase with time reaching maximum value of 71% after 2 hours of irradiation.

Keywords: *nanocrystalline, Thin films, gel, Keywords: sol, Photocatalyts.*

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SYNTHESIS OF LEAD-FREE CERAMICS OF THE PEROVSKITE TYPE FOR PIEZOELECTRIC APPLICATIONS BY CONVENTIONAL SOLID-STATE REACTION

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ABSTRACT

Structural properties of $BaTiO_3$, $CaTiO_3$ and Ba0.85Ca0.15Ti0.9Zr0.1O3 prepared by conventional solid state reaction technique, at different calcinations temperatures 1100, 1150 and 1280 Â° C and sintering temperatures (1200 and 1300 °C) are studied. These compositions were selected because of their interesting piezoelectric properties. To follow the decomposition process of the precursor, a Differential thermal analysis coupled with thermogravimetric analysis (ATG-ATD) was performed. Structural parameters are analyzed by X-ray diffraction (XRD) and scanning electron microscopy (SEM). The results obtained in this study clearly showed that synthesis of the perovskite phase. The diffractogram illustrates that BCTZ symmetry is both cubic with a Pm-3m space group and orthorhombic with a R3m space group, the calculated phase rates are respectively 10% and 90%. The results allowed us to specify the effect of sintering temperatures on the properties of ceramics.

Keywords: *microstructure, synthesis, Lead free ceramics, perovskite*

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TM-DOPED ZINC OXIDE THIN FILMS DERIVED FROM SOL-GEL: STRUCTURAL, OPTICAL AND NANOMECHANICAL STUDIES

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ABSTRACT

Undoped and Transition Metals TM (TM = Cr, Ni, Mn, Cd) doped Zinc oxide (ZnO) thin films were prepared by Sol-gel dip-coating method on glass substrate at 300 Â°C. In this study, the effect of dopant material on the structural, morphological, optical and nanomechanical properties of ZnO thin films is investigated using XRD, AFM, UV-Vis and Berkovich nanoindentation techniques, respectively. Nanocrystalline films with hexagonal wurtzite structure and two preferred orientations (002) and (103) were obtained. UV-Vis transmittance spectra showed that all the films are highly transparent in the visible region (> 80 %). Moreover, the optical band gap of the films decreased to 3.13 eV with an increasing orbital occupation number of 3d electrons. The topography of the films was found dense, smooth and uniform, with the exception of the high roughness RMS =26.3 nm obtained for Cd-doped ZnO. Finally, the dopant material is found to have a significant effect on the mechanical behavior of ZnO as compared to the bulk material. For (Ni, Cd) dopants, analysis of load and unload data yields an increase in the hardness (8.96 Â± 0.22 GPa) and Young's modulus (122 Â± 7.46 GPa) of ZnO as compared to (Cr, Mn) dopants. Therefore, Ni and Cd are the appropriate dopants for the design and application of ZnO-based nanoelectromechanical systems.

Keywords: *mechanical, films, transition metals, ZnO, nanoindentation*

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TRANSITION DE PHASE TOPOLOGIQUE DANS LES COMPOSES DEMI-HEUSLER

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ABSTRACT

La prédiction de l'existence de composés appelés isolants topologiques a marqué une avancée spectaculaire depuis l'émergence de l'effet Hall quantique de spin (EHQS) à deux, puis à trois dimensions. Ces matériaux, prédits d'abords théoriquement, puis expérimentalement, présentent un nouvel état quantique de la matière pour lequel le matériau est isolant en volume, et conducteur en surface ou sur les bordures. Ils ont ainsi attiré l'attention depuis une décennie grâce à leurs applications dans de nouveaux dispositifs spintroniques. Les premiers isolants topologiques découverts étaient soit des alliages tel que Bi1-xSbx, soit des composés binaires tel que le HgTe. Plus récemment, cet état a été trouvé pour les demi-Heusler ternaires, ouvrant ainsi une porte à une large gamme d'isolants topologiques. Une étude théorique utilisant les ondes planes augmentées linéarisées (FP-LAPW) et l'approche du gradient généralisé (GGA-PBE) prenant en compte l'interaction Spin-Orbite (SO) pour les atomes lourds afin d'étudier les propriétés structurales et électroniques de quelques isolants topologiques a été effectuée (Le package est implémentée dans le code de calcul WIEN2K). Les résultats obtenus montrent que ces isolants topologiques possèdent une forme très particulière de la structure de bande, caractérisée par un gap nul et une inversion entre les symétries Γ6 et Γ8, traduisant une inversion entre les états s et p. Une étude utilisant l'approximation GGA+SO modifiée par le potentiel de Becke et Johnson (TB-mBJ) de l'effet d'une pression hydrostatique sur un matériau, initialement semi-conducteur, à permis de conclure que le matériau passe d'un état trivial (semi- conducteur) sous compression, vers un état non-trivial (Isolant topologique) sous l'effet d'une dilatation. Une grandeur physique appelée la force d'inversion de bandes (BIS=Δ=E(Γ6)-E(Γ8)) a été définie et calculée; Sa variation sous l'effet de la pression a permis de distinguer la transition de phase topologique.

Keywords: *Transition de phase topologique., Propriétés physiques, Couplage Spin Orbite*

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STRUCTURAL AND ELECTRICAL CHARACTERIZATION OF CR, NI, SB SUBSTITUTED PZT PIEZOELECTRIC CERAMICS

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ABSTRACT

Perovskite PZT variants were synthesized from stoichiometric oxide ratios of Pb, Zr, Ti, Cr, Ni and Sb. The oxide powders were mixed mechanically and calcinated, and then sintered to form the desired perovskite phase. The detailed structural and ferroelectric properties were carried out for sintered specimens. The results of X-ray diffraction showed that all the ceramics specimens have a perovskite phase. The multi-component ceramic system consists of the (0.80 - x)Pb(Cr1/5,Ni1/5,Sb3/5)O3-xPbTiO3-0.20PbZrO3 (PZT-CNS), with $0.30 \leq x \leq 0.42$, and the ternary system near the rhombohedral/tetragonal morphotropic phase boundary(MPB) was investigated by X-ray diffraction and dielectric properties. In the present system, the MPB that coexists with the tetragonal and rhombohedral phases is a narrow composition region of x = 0.38 - 0.42. The scanning Electron Microscopy (SEM) showed an increase of the mean grain size when the sintering temperature was increased. A sintered density of 92.93% of the theoretical density was obtained for Ti = 42% after sintering at 1180˚C. Ceramics sintered at 1180˚C with Ti = 42% achieve excellent dielectric properties, which are as follows εr = 4262.48, and Tc = 340˚C.

Keywords: *tetragonal, rhombohedral, morphotropic phase, PZT*

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SOL GEL SYNTHESIS AND THERMAL TREATMENT EFFECT ON CE3+ DOPED GDBO3 NANOCLUSTERS OBTAINED IN SILICA GLASS

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ABSTRACT

Silica glass samples containing GdBO3/Ce3+ nanoclusters were prepared by sol gel process. The effect of thermal treatment on the structural and optical properties was investigated. From DSC and XRD analysis, it is found that the GdBO3 hexagonal vaterite phase crystallizes inside the silica glass above 800°C. The average crystallites size ranges between 20 to 50 nm when the temperature increases from 800°C to 1000°C. TEM-EDS analysis evidenced the presence of GdBO3/Ce3+ nanoclusters inside the silica matrix. Fourier transform infrared spectroscopy (FTIR) shows the presence of silica and borate linkages with significant changes in the intensity when the temperature increases from 500°C to 1000°C. Finally, photoluminescence measurements showed that the sample heat treated at 1000°C present the maximum photoluminescence intensity assigned to the 5d 4f transition of Ce3+ ions.

Keywords: *thermal treatment., Ce3+ ions, nanoclusters, Keywords: Sol gel*

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ATOMISTIC MODELING OF NUCLEAR FUEL CLADDING MATERIAL

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ABSTRACT

To reduce the influence of the severe conditions in a nuclear reactor environment and then to increase the aging of the fuel rods and enhance the safety of the nuclear power plants, Zirconium alloys are used as a cladding material. Iron has been put in many quantities in order to give the best the thermal and mechanical properties of the fuel rods cladding. Adding an atom of Iron as an impurity in the supercell in a specific interstitial site of Zirconium has shown an obvious change in mechanical properties comparing with clean zirconium. Besides, a slight change has been proven of the Bulk modulus dependent on temperature. As a result, these led us to understand the importance of the iron impurity in order to achieve good mechanical properties of the fuel rods materials in purpose to prevent weakness and the cracks of the nuclear fuel rods cladding under severe conditions.

Keywords: *mechanical properties, Ab initio, Fe, Zr, Bulk modulus, impurity*

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DYNAMIC BEHAVIOR ANALYSIS OF FGM CLAMPED NANO-PLATES BASED ON ELASTIC FOUNDATIONS

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ABSTRACT

An analytical study to predict the behaviour of clamped FGM nanoplates based on Pasternak's elastic foundations using hyperbolic shear deformation theory. non-local elasticity theory is used to introduce the small-scale effect. The influence of geometry parameters, foundation rigidity and material properties on the behaviour of FGM nanoplates are determined. The results are compared with those in the literature.

Keywords: *HSDPT, Effet d'échelle, théorie non locale, nanoplaque, FGM*

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STRUCTURAL, ELECTRONIC, OPTICAL AND PHOTOCATALYTIC PROPERTIES OF TA(1-X)VXON: A DFT+U STUDY

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ABSTRACT

In this work, the GGA+U method was used to study the structural, electronic, optical, and redox properties of the Ta(1-x)VxON alloy. The obtained results show that the three lattice parameters (a, b, and c) decrease linearly with increasing V content and this means the Vegard's law is verified in the case of this alloy. We find also that electronic structure of the Ta(1-x)VxON alloy is very sensitive to the V composition (x). Although the band gap nature remains unchanged and the gap is always indirect for all used x values, however, the energy band structure of this alloy depends greatly on the V composition. We find that the band gap of the Ta(1-x)VxON alloy can be tuned by controlling the concentration of V atoms. Moreover, the optical absorption coefficient of the Ta(1-x)VxON alloy in the Vis and UV regions of the optical spectrum is higher than that of TaON. Our results show also that refractive index of Ta(1-x)VxON alloy is higher than that of TaON. We have also studied the redox properties of the Ta(1-x)VxON alloy and the obtained results show that this alloy has a positive VB potential and consequently it can used as photoanode for water oxidization reaction.

Keywords: *photocatalysis, metal oxynitride, TaON, VON*

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NATURAL FREQUENCIES OF FUNCTIONALLY GRADED PLATE COMPOSED OF A MIXTURE OF TITANIUM (TI-6AL-4V) AND ZIRCONIA (ZRO2)

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ABSTRACT

In the present paper, the higher order shear deformation theory is used to analyze the natural frequencies of simply supported functionally graded plate composed of a mixture of Titanium (Ti-6Al-4V) and zirconia (ZrO2) resting on elastic foundation. This theory accounts for adequate distribution of the transverse shear strains in the thickness of the plate and satisfies the traction free boundary conditions on the top and bottom surface of the plates, thus a shear correction factor is not required. The material properties change within the plate thickness according to the power law distribution of the volume fraction of the constituents (Titanium and zirconia). The equations of motion are derived employing the principle of Hamilton. Navier type solutions are proposed to obtain the natural frequencies of functionally graded plate and efficiency of the theory is ensured by comparing the results with the existing results. Numerical results are computed to examine the effects of different geometrical parameters such the power-law index, aspect ratio, elastic foundation parameters, and side-to-thickness ratio, on the natural frequencies of simply supported functionally graded plate. It can be concluded that the presence of the elastic foundation increases the non dimensional natural frequencies. It can be found also that the normalized natural frequencies of the plate decrease with increasing the volume fraction exponent and slenderness ratio.

Keywords: *elastic foundation., functionally graded material, free vibration, Natural frequencies*

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EFFECT OF [NI2+] / [CO2+] MOLAR RATIO ON THE STRUCTURAL AND MICROSTRUCTURAL PROPERTIES OF ELECTRODEPOSITED CO-NI NANOMATERIALS

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ABSTRACT

The study presented in this paper revolves around electrodeposited Co-Ni nanomaterials which were performed by electrodeposition process from chloride-sulfate bath with different [Ni2+] / [Co2+] molar ratio. Studying the chemical composition of the obtained Co-Ni deposits was accomplished by Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES). The results showed the formation of electrodeposited Co-Ni nanomaterials and the dependence of their chemical composition on [Ni2+] / [Co2+] molar ratio. The anomalous deposition behavior was indicated by the presence of a high percentage of the less noble metal (Co) in all the deposits than in the bath. Structural and microstructural changes during the electrodeposition process were followed by X-ray diffraction technique (XRD). The Maud program was used to analyze the resulting XRD patterns. The outcome was the formation of a mixture of FCC and HCP structures with nano scale grain size corresponding to the pure element of Co, Co(Ni) and Co(S) solid solutions. The decrease of the molar ratio of [Ni2+] / [Co2+] led to the increase of the crystallite size of different HCP solid solutions in parallel with a decrease of their internal strains. Above 50 at. % Co, a large percentage of HCP structure was exhibited by the Co-Ni obtained deposits.

Keywords: *molar ratio, Rietveld analysis, Electrodeposition, Nanomaterials, anomalous codeposition*

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OPTICAL PROPERTIES OF SICN THIN FILMS DEPOSITED BY REACTIVE SPUTTERING

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ABSTRACT

This paper studies optical properties of amorphous silicon carbonitride (a-SiCN) thin films deposited on polished and texturized silicon wafers by reactive RF magnetron sputtering technique. Different samples were made at room temperature by sputtering a silicon carbide (SiC) target in argon and nitrogen mixture environment.The optical properties were achieved from reflectivity spectra by UV-visible spectroscopy. The refractive index (n2.2 eV) of the deposited films depended on the used argon and nitrogen flows. The a-SiCN films show a good suitability for the antireflective coating application.

Keywords: *reflectivity, reactive magnetron sputtering, SiCN thin films, AR coating*

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NUMERICAL STUDY OF FLUID FLOW AND HEAT TRANSFER AROUND A ROTATING CYLINDER UTILIZING NANOFLUID

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ABSTRACT

The forced convective flow and heat transfer of nanofluids past a rotating cylinder placed in a uniform cross stream is investigated numerically. The computations are carried out at a representative Reynolds number (Re) of 200. The dimensionless cylinder rotation rate (α) is varied between 0 and 6. The range of nanoparticle volume fractions (φ) considered is $0 \leq \varphi \leq 5\%$. Two-dimensional and unsteady mass continuity, momentum, and energy equations have been discretized using finite volume method. SIMPLE algorithm has been applied for solving the pressure linked equations. The effect of rotation rates (α) on fluid flow and heat transfer were investigated numerically. In addition, time-averaged (lift and drag coefficients and Nusselt number) results were obtained and compared with the literature data. A good agreement was obtained for both the local and averaged values.

Keywords: *finite volume, Reynolds number, volume fraction, nanofluid, unsteady flow, circular cylinder*

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CONTACT ANGLE OF POLYMERIC THIN FILMS DEPOSITED BY A METHANE PLASMA

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ABSTRACT

Superhydrophobic surfaces are highly desired for several applications due to their exceptional properties such as self-cleaning, anti-icing, anti-friction and others. In this work, a treatment of surface paper to improve its hydrophobicity is performed, for that; we used an O2 plasma etching and non-thermal CH4 PECVD technics. The top plasma creative electrode is a hollow cathode comprising 07 holes of 40 mm diameter each in order to improve the density of the plasma for an efficient surface treatment in terms of growth kinetic. Two types of deposits have realized; in the first one, the substrates were held on a grounded substrate distant of 50 mm from the hollow cathode with time variation of 5, 10, 15 and 20 min, while pressure and power have been kept constant at 8.10-2 mbar and 100 W respectively. In second experiment series, the time and pressure were kept constant at 10 min and 8*10-2 mbar, while power has been settled at 50, 200 and 500 W) To show the differences in the as deposited layers, we proceeded to carry out structural and morphological characterization of the layers. The measurement of contact angles indicates that the surface of each layer behaves differently when in contact with a drop of water. It is found that the layers connected to the mass, present a super-hydrophobic surface. Polarization has an effect on the hydrophobicity, the layer deposited at 10 min and 50 W presents a hydrophilic surface with 8.5°, increasing power improve the hydrophobicity, it passes to 111° when the polarization is 200 W, and 500 W respectively.

Keywords: *Silicon Substrates, PECVD, Hydrophobic, Polymeric, Paper Substrates*

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FORMULATION AND OPTIMIZATION OF DICLOFENAC SODIUM MICROSPNGES

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ABSTRACT

The aim of the present study was to formulate and optimize the Diclofenac sodium (DC) microsponges by central composite design. Quasi emulsion solvent diffusion method was used to formulate microsponges. The ratio of ethyl cellulose (EC) to DC, polyvinyl alcohol (PVA) concentration (w/v %) were selected as independent variables. Entrapment efficiency (EE) and production yield (PY) were selected as independent variables. Factors and their levels were substituted in the design of experiment software (MINITAB 18). The effect of factors at different levels on response variable was predicted using poly nominal equations. DC microsponges showed an acceptable EE 30.02% and PY 63.78%, FTIR studies revealed no chemical interaction between drug and polymer used. The morphology of microsponges was studied using an optical microscopy and it was found that microsponges were spherical and present an average size of 9.06±0.3µm. USP Type II dissolution apparatus with cellulose dialysis membrane was used to study in vitro drug release. Kinetic studies revealed that drug release from optimized formulation followed korsmeyer peppas model with an anomalous non fickian diffusion mechanism. The results demonstrated the effectiveness of proposed design for development of DC microsponges for the sustained release.

Keywords: *central composite design, sustained release, diclofenac sodium, microsponges*

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WEAR, CORROSION, AND BIOCOMPATIBILITY OF ZIRCONIUM AND TITANIUM BASED ALLOYS PVD THIN FILMS

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ABSTRACT

Electrochemical behavior, bioactivity and wear of based Ti and Zr multilayer thin films deposited via D.C reactive magnetron sputtering on Ti6Al4V and Si (100) substrates. Samples were characterized by optical microscopy and scanning electron microscopy (SEM/EDS). All samples demonstrate a strong resistance against corrosion in SBF solution. The dominant wear mechanism, in the case of Ti based alloys, was abrasive and adhesive wear. While abrasion was the unique wear mechanism observed in Zr alloys/bone contact. Based on wettability results the influence of the oxygen was discussed. Ti/TiN/TiO2 and Zr/ZrN PVD multilayer coatings could be viable materials for bone prostheses.

Keywords: *Wear, Corrosion, PVD, Wettability*

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EFFECT OF SOLUTES ON MECHANICAL BEHAVIOR ASSISTED BY PHASE TRANSITION IN TIAL BASED ALLOYS

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ABSTRACT

TiAl alloys have been devoted as a candidate material suitable for high-temperature applications due to their outstanding material properties. However, the low ductility and toughness at room temperature limit greatly its application. In this work, effects of solutes (Mo, W) on mechanical properties and electronic structure in L10 and B2 TiAl alloys were studied using first-principles calculations based on density functional theory (DFT). It is found that there is a phase transition from L10 to B2 TiAl with increasing the concentrations of Mo and W. Based on the predicted elastic constants and mechanical properties, the ductility of TiAl is well enhanced due to the phase transition. Furthermore, the density of states (DOS) is also studied to analyze the mechanical behavior in TiAl with and without alloying elements. The DOS revealed that solutes could weaken p-d interactions between Al and Ti atoms but improved d-d interactions between Ti and alloying atoms in the electronic structure of TiAl alloys resulting thus the improvement of ductility.

Keywords: *electronic structure, mechanical behavior, first principles, TiAl, solutes.*

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ZNO/TIO2 MULTILAYERED NANOSTRUCTURES AS CORROSION PROTECTION COATINGS FOR METALS (SS 304)

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ABSTRACT

Corrosion is a harmful phenomenon that affects metals and alloys in general. This inevitable problem causes the deterioration of a quarter of the world's production of metallic materials every year. Since several decades, scientists had focused their research on this problem in order to find impressive solutions to reduce the impact of this problem. They proposed more techniques to improve corrosion protection performance of these materials. Metal coatings, inhibitors and thin films and others were well developed in this case. Metal coatings were elaborated at high temperatures, which makes the process difficult to carry out and shows a great danger in the event of an accident. Inhibitors were used but their weaknesses, disadvantages are high cost, toxicities and cannot be used in opened environments, and their harmful effect on the environment has become undesirable. In last years, more studies were carried out on the deposition of nanostructured coatings by physical and chemical methods. The sol-gel method generate the interest of researchers around the world by its advantageous properties, as the low cost, easy to apply, will be done at room temperature and environment friendly. The objective of this research work is the deposition of ZnO/TiO2 nanostructure coatings on 304 stainless steel by the sol-gel (dip-coating) method. The obtained thin films were characterized by different techniques: X-ray diffraction (XRD), scanning electron microscope (SEM), atomic force microscope (AFM) and corrosion behaviour was carried out by potentiostatic (SIE) and potentiodynamic (Tafel diagrams) tests. The obtained results reveal an excellent corrosion protection efficiency that reached 98%.

Keywords: *Corrosion, Stainless Steel, Sol, gel, ZnO, TiO2, Electrochemical impedance spectroscopy.*

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NEW PEROVSKITES MATERIALS WITH FERROELECRIC PROPERTIES

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ABSTRACT

Perovskites structural materials of general formula ABO3 have found very interesting because of their excellent functional properties. Among these, ferroelectric materials are distinguished by nonlinear dielectric properties that are closely related to crystal symmetry. These features make them useful in a wide range of devices, such as sensors, actuators, etc. Such materials are also applicable in the field of energy.In this way, solid solutions of complex formula Ba1-xBi2x/3(Ti0,95-yZry)Sn0,05O3 were prepared by the solid route at high temperature. The investigations were carried out in the compositions ranges 0.05 £x £ 0,10 and 0.05 £y£ 0,30. Heat treatment and sintering of the samples were carried out at 850 °C and 1150 °C, respectively. X-ray diffraction study at room temperature as well as Raman spectroscopy analysis revealed a perovskites phase. The temperature and frequency evolutions on the real relative permittivity and dielectric losses revealed a classical ferroelectric behavior or relaxors according to the bismuth and zirconium amounts. A correlation between these ferroelectric behaviors and the crystalline symmetry of the compounds Ba1-xBi2x/3(Ti0,95-yZry)Sn0,05O3 has been established : classical ferroelectric materials exhibit quadratic symmetry, while relaxors are distinguished by cubic symmetry. This correlation is corroborated by physical and structural models. Moreover, some of these compositions exhibit a maximum of real relative permittivities in the vicinity of room temperature. Such compositions are promising candidates to replace the lead bases materials currently used in the industry

Keywords: *ray diffraction, X, Ceramics, ferroelectric.*

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CA-ALGINATE-CAROB GALACTOMANNANS BEADS TO PRESERVE VIABILITY DURING DIGESTIVE HOSTILITY TRANSIT AND CHOLESTEROL UPTAKE ABILITY OF PROBIOTICS BACTERIA.

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ABSTRACT

The assurance of the bacteria survival is the key of the protective technique aiming to alleviate the bacteria resistance under digestive hostilities. Among the methods of protection, microencapsulation of cells in various biomaterials has given convincing results. We tried to exploit for the first time the emulsifying properties of carob galactomannans reinforced herein by the sodium alginate gel in the microencapsulation of beneficial bacteria. On the other hand, we explored the benefits of this protective technique upon the expression of the bacterial ability to uptake cholesterol, in complement to our previously published results. The present study aimed to develop a new mixed gel containing calcium alginate and galactomannans extracted from the Algerian carob seeds endospermes, for the microencapsulation of the human strain of Lactobacillus rhamnosus LbRE-LSAS; compared with the probiotic strain of Bifidobacterium animalis subsp. lactis Bb12. Influence of microencapsulation was tested under simulated digestive environment to verify if both bacteria preserve their viability and their cholesterol assimilation ability. High viable loads of encapsulated LbRE-LSAS and Bb12 were registered (6.97 and 8.66 of 10 Log CFU g-1, respectively). Conversely, the free cell levels strongly ($P < 0.05$) decreased during exposure to the digestive simulated conditions. According to our results, the new formed gel permits to improve 1.8-fold on average the cholesterol assimilation ability of probiotic bacteria. We underlined the possible use of carob galactomannans-Ca-alginate beads as alternative healthy solution in protecting beneficial bacteria under gastro-intestinal ad by the way, lowering the serum cholesterol level in host.

Keywords: *Cholesterol assimilation Ability, Beads, Survival, Probiotics, Ca alginate gel, Carob galactomannans, Health benefits.*

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ELECTROCHEMICALLY DEPOSITED POLYTHIOPHENE FOR DYE-SENSITIZED SOLAR CELL COUNTER ELECTRODES

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ABSTRACT

Polythiophene and its derivatives were coated on conductive glass by electrochemical deposition from a solution containing the monomer. The obtained structures were used as counter electrodes (CEs) for dye-sensitized solar cells (DSSCs). Several parameters such as monomer concentration or time of deposition were changed in order to optimize the conditions for a better performance. Polythiophene/FTO, Poly(3-hexylthiophene)/FTO and Poly (3, 4-ethylenedioxythiophene): polystyrenesulfonate (PEDOT:PSS)/FTO were characterised by Scanning electron microscopy. It was revealed that the polymer film thickness increased with the deposition duration. The electrocatalytic activity of the CEs was studied in I−/I3− electrolyte and the photoelectric properties of the CEs were studied as well. Moreover, the efficiency of the cells assembled with the Polythiophene, Poly(3-hexylthiophene) and (PEDOT:PSS) CEs and TiO2 photoanodes were studied. The performances of polythiophène-based DSSCs are dependent upon polymer thickness.

Keywords: *polythiophene, ethylenedioxythiophene): polystyrenesulfonate, 4, Poly (3, Counter Electrodes.*

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NEW TRANSPARENT ELECTRODES BASED ON AG NANOWIRES PREPARED BY SPRAY PYROLYSIS FOR PHOTOVOLTAIC APPLICATION

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ABSTRACT

A solution-processed, highly transparent, conductive electrode based on SnO2 and spray-deposited silver nanowires (Ag NWs) is developed as an effective top contact for solar cells, the surface coverage, thickness, and absorbance properties of the silver nanowire films were controlled by the number of layers deposited and after deposition the effects of the annealing temperature at room conditions were investigated. Films were characterized using scanning electron microscopy (SEM) (illustrated in Figure 1), Atomic Force Microscope (AFM), Hall Effect measurements and UV/vis absorption spectroscopy. Optical transmittance was influenced by the annealing temperature, the films showed an average transmittance between 65,4 to 82,7% by varying annealing temperature from 150 to 300°c the highest transmittance average value in visible spectrum was achieved for 180°c with good electrical conduction properties where the sheet resistance was 18 Î© /square. The role of the first deposited SnO2 layer is o ensure good adhesion and distribution of Ag NWs on the substrate surface. Scanning electron and atomic force microscopy were used to study the morphology of SPD thin films which was affected by annealing temperature. Such electrodes can contribute in fabrication of cost-effective tandem solar cells.

Keywords: *Vis spectroscopy., Uv, Ag Nanowires, transparency, SnO2, Thin films*

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BIOPOLYMERS-BASED THIN FILMS AS AN EMERGING PLATFORM FOR ANTIHYPERGLYCEMIC DRUG DELIVERY

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ABSTRACT

Pharmaceutical researches are exploring thin films as a new drug delivery tool and particularly films based on natural materials such as biopolymers which is a subject of great interest for the biomedical community. Biomedical device construction is challenging because it is difficult to fabricate devices that are both biocompatible and portable. Therefore, the aim of the present study is to design matrix type transdermal films of Metformine (MET) as an alternative delivery approach to improve patient compliance to diabetes disease treatment. Chitosane (CTS) and Kappa carrageenan (KC) in different ratios were used as matrix-forming agent using the solvent casting technique. Glycerin and Menthol were added to the films as a plasticizer and permeation enhancer, respectively. As well as mechanical strength and bioadhesiveness of optimized transdermal films, the impact of CTS/KC ratios in polymeric membrane films on the enhancement of the mechanical properties, flexibility and plasticity was investigated. Microstructure of CTS/KC films was tested using a Scanning Electron Microscope (SEM), FT-IR spectroscopy and atomic force microscopy (AFM). With the increase in KC concentration, tensile strength (TS), young's modulus (YM), elongation at break (EB) and bioadhesion strength has displayed increased value compared to the pure chitosan film. The SEM micrographs of binary films with different ratios showed a smooth homogeneous surface. The results of FT-IR study explain the presence of electrostatic interactions between CTS/KC films. This may be attributed to the effect of polyelectrolyte complex formation in CTS/KC films, especially at (1/1) ratio. The ex-vivo skin permeation study indicated high drug flux and good permeation enhancement effect.

Keywords: *Thin films, Kappa Carrageenan, Chitosane, Transdermal drug delivery*

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MICROSTRUCTURAL, MORPHOLOGICAL, ELECTRICAL AND OPTICAL PROPERTIES OF PURE AND MG DOPED ZNO THIN FILMS

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ABSTRACT

Doping is a widely used phenomenon to improve the structural, electrical and optical properties of semiconductor materials. However the synthesized route is also very important to obtain nanomaterials with improved properties. Zinc oxide (ZnO) nanostructures doped with different Mg concentrations (0%, 1%, 3% and 5%) have been synthesized by sol-gel route using dip coating technique. The used precursor is ZnCl3 dissolved in ethanol. The obtained thin films were characterized by: X-Ray diffractometer, SEM, UV-Vis, AFM and Hall Effect. The XRD spectra indicate that pure and Mg doped ZnO exhibit a wÃ¼rtzite crystalline structure with a preferential direction [101] with grain sizes varying between 7.41 and 43.12 nm. SEM images showed very small particles in the presence of pores. The UV-visible spectra show that all samples of pure and Mg doped ZnO films have a good transmittance between 62 and 85% in visible region, and an optical gap varying between 3.28 and 3.64 eV. On the other hand the AFM images show that the surface morphology of all ZnO thin films exhibit a uniform and smooth surface. They can also indicate a change in the preferential direction of the particles

Keywords: *nano, Solar cells, Nanostructure, Coating, Dip, Zinc oxide, Materials*

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PARAMETRIC STUDY OF NANOPARTICLES EFFECTS ON CONVECTIVE HEAT TRANSFER OF NANOFLUIDS IN A HEATED HORIZONTAL ANNULUS

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ABSTRACT

This study presents a numerical simulation of the three dimensional laminar forced convection between two concentric horizontal cylinders using three different nanoparticles types Cu, Al2O3 and TiO2 with constant physical properties. The inner cylinder is adiabatic whereas uniformly the outer cylinder is uniformly heated. The flow and thermal fields are modeled by the continuity, momentum and energy equations with appropriate initial and boundary conditions using a cylindrical coordinate system. The model equations are numerically solved by a finite volume numerical method with a second order accurate spatiotemporal discretization. To examine the effect of the volume fraction and nanoparticles types on the heat transfer and the flow behavior, the study has been carried out for the Reynolds number Re=800 to 1200 and the solid volume fraction 0 to 6%. The results obtained clearly show that the inclusion of nanoparticles into the base fluid produces a significant enhancement of the convective heat transfer. This enhancement increases as function of growing volume fraction and Reynolds number. In addition, the obtained Nusselt number it also increases with both the increase of the concentration and the Reynolds number. On the other hand, is higher when using the type of Cu nanoparticle.

Keywords: *forced convection, nanoparticles types, Annulus, Numerical study, Nanofluids*

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SYNTHESE ET CARACTERISATION DES PROPRIETES STRUCTURALES, OPTIQUES ET ELECTRIQUES DES COUCHES MINCES ZNO CO-DOPEE PREPARE PAR LA METHODE SOL-GEL SPIN-COATING

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ABSTRACT

Dans ce travail, nous avons synthétisé des couches minces d'oxyde de zinc (ZnO) non dopées et co-dopées par la méthode sol-gel spin-coating sur des substrats de verre, afin d'obtenir des films transparents et conducteurs peuvent être utilisé dans les applications photovoltaïques. L'analyse par la méthode de diffraction des rayons X révèle que les films cristallisent dans la structure hexagonale Wurtzite typique de ZnO avec une orientation préférentielle suivant le plan (002). La taille des cristallites pour le ZnO pur est d'ordre de 14 nm, après le co-dopage par l'Indium et l'Yttrium la taille des cristallites augmente jusqu'à 17.51 nm. Les spectres d'UV visible montrent une grande transparence dans le domaine de visible (200 nm-800 nm) avec une valeur de transmission autour de 90%, l'énergie de la bande optique interdite varie de 3.2 à 3.25 eV. Tandis que, les caractérisations électriques ont révélé que la valeur de la résistivité est diminuée après le co-dopage de 18.54×10-3 Ω.cm jusqu'à 4.5×10-3 Ω.cm.

Keywords: *Résistivité., ZnO codopée, Spin coating, Couches minces*

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PLASMA REACTIVE-ION ETCHING OF ZNO THIN FILMS USING A CH4/H2 GAS MIXTURE FOR WAVEGUIDING APPLICATIONS

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ABSTRACT

In recent years, zinc oxide has attracted increasing attention due to its remarkable properties such as wide direct band gap, large exciton binding energy, material stability and high transparency. These advantages place ZnO as an ideal candidate for several potential applications including light emitting diodes, laser diodes, ultraviolet photodetectors and optical waveguide. Channel waveguides, for their capacity to confine light both laterally and in depth, are the basic blocks of many passive and active integrated optical devices such as switches, splitters, and amplifiers. Different fabrication processes can be used to manufacture two dimensional guiding structures. The choice is not univocal and must be taken carefully in order to obtain the best performance for the device that one wants to fabricate. Recently, Plasma etching emerged as a powerful tool in the patterning of wavesguiding structures, due to some advantages including repeatability, uniformity, vertical profile and low device damage. ZnO is readily etched using numerous gas combinations, such as Cl2/Ar, BCl3/Ar, BCl3/CH4/H2, HBr/Ar and CH4/H2. A gas mixture of CH4/H2 might be helpful to achieve smooth sidewalls and anisotropic profiles because the reaction products are highly volatile. In this work, ZnO thin films were grown on SiO2/Si substrate via RF magnetron sputtering technique. The structural, morphological, and waveguide properties of the synthesized films were investigated by X-ray diffraction (XRD), scanning electron microscopy (SEM), and M-lines spectroscopy (MLS). X-ray analysis confirmed that the deposited thin films had a hexagonal wÃ¼rtzite structure. SEM micrographs show an uniform homogeneous surface consisted of small spherical grain size particles. The obtained results from (MLS) measurements at 632.8 nm wavelength have demonstrated that our films are monomodes planar waveguides. Microfabricated ZnO/SiO2/Si rib waveguides with different widths were patterned using e-beam lithography and high-density plasma etching. Profiles and sidewalls of the waveguides were characterized by SEM and AFM microscopies.

Keywords: *(ICP/RIE) etching, EBL lithography, Rib waveguides, ZnO thin films*

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OPTIMISATION OF EXCHANGE COUPLING STRENGTH IN FEXPD100-X (X=57.5, 60, 64)

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ABSTRACT

Fe57.5 Pd42.5, Fe60Pd40, and Fe64Pd36 thin films have been fabricated by thermal evaporation onto single-crystal substrates. According to the Fe-Pd phase diagram, for these compositions, the alloys optimized for obtaining hard magnetic properties with the development of the L10 phase should be able to display the coexistence of a soft a-Fe phase and a hard L10 FePd phase. The aim of this work is to promote exchange interactions between these two phases in this alloy system and optimized for high magnetic performance, in order to achieve an exchange-spring magnetic behaviour. Annealing at 600 °C promotes the transformation of the fcc FePd phase into L10 FePd phase, while a-Fe phase remains stable. The structural transformations are accompanied by an increase of the coercive field and the remanence ratio in thin films with the decrease of the palladium composition. The exchange-coupling performance can be identified from to the obtained map shape order reversal curves (FORC).

Keywords: *exchange, L10 FePd phase, Thermal evaporation, coupling.*

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MICROSTRUCTURAL CHANGES OF NANOCRYSTALLINE NBC 0.93 POWDERS PREPARED BY HIGH-ENERGY BALL MILLING

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ABSTRACT

In the present work, nanocrystalline NbC0.93 powders were produced through high-energy ball milling from the mixture of Nb and C elemental powders under argon atmosphere. The milling process was carried out in a high-energy planetary ball mill Fritsch Pulverisette 7, at room temperature. The effect of milling on the particle size and morphology is studied. The phase transformation and powder morphology characteristics were studied using X-ray diffraction (XRD) and scanning electron microscopy (SEM). Microstructure changes, such as crystallite size, microstrains were determined from the Rietveld refinement of the X-ray diffraction patterns. The results showed that nanocrystalline powders of nonstoichiometric niobium carbide with average nanocrystallite size of 20 nm were fabricated by 20 h milling. The SEM data indicated the agglomeration of powder particles.

Keywords: *Milling; Nanocrystalline; Microstructure; Carbide; Powders*

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Topic 2: Cementitious Materials and Materials Properties

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ELABORATION AND CHARACTERIZATION OF CERAMIC MEMBRANES FOR WASTEWATER TREATMENT

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ABSTRACT

This study is related to the development of microfiltration ceramic membranes using TiO2 membranes, is described the fabrication of porous ceramic membranes; tubular supports have been produced using the extrusion technique; the microfiltration top layer has been prepared from titania powder suspensions using slip casting technique. The structure was analysed by X-ray diffraction (XRD) and mercury porosimetry techniques; the presence of possible defects in the prepared porous ceramic materials was investigated by scanning electron microscopy (SEM).The support sintering temperature at 1425C° showed a pore diameters of about 12µm and a porosity of about 46%. The microfiltration (MF) membrane layer has a thickness of 40 Î¼m or so and an average pore size (APS) value of about 0.8 µm. The measured water permeability is about 10444 L.h-1.m-2.bar-1 and 5358 L.h-1.m-2.bar-1 for ceramic supports and TiO_2 membranes, respectively. The performance of the microfiltration ceramic membrane was determined in order to evaluate both the water permeability and oil rejection. In this work, composite ceramic membranes in a tubular configuration was prepared. The result is an MF layer having an APS of about 0.8 µm, a narrow pore size distribution and good water permeability. Finally, this result enabled us to obtain the effectiveness of the filter and its ability to reduce the concentration of oil removal efficiency of 87%. .

Keywords: *pore size distribution, porosity, average pore size, Membranes, titania, oil rejection.*

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ULTRASOUND-ASSISTED EXTRACTION OF POLYSACHARIDES FROM ATRACTYLIS GUMMIFERA ROOTS

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ABSTRACT

The isolation of valorizable natural polymers from fruits and vegetables has been studied for decades, but it still motivates academic and technological research on the principle of sustainable and ethical development. In recent years, many researchers have focused on polysaccharides in fruits and vegetables because it has been found that these isolated polysaccharides play an important role in the biomedical field because of their therapeutic effects. In addition, they are also used to produce nanocomposite materials for energy production and storage, electrical devices and other engineering applications. Atractylis gummifera L is a plant that belongs to the Compositae family with a significant application in traditional medicine in particular its roots. They are a rich source of coumarins, flavonoids, polysaccharides, fatty acids and saponins. To our knowledge, there are no available reports on the nature and proportion of polysaccharides of Atractylis gummifera L. Therefore, the objective of the present study is to isolate water-soluble polysaccharides, at a high purity level, from the dry roots of Atractylis gummifera L by the application of an assisted extraction procedure by ultrasound. An activated carbon pretreatment clarification procedure was applied to remove impurities from the aqueous extracts. The identification of the polysaccharides was carried out by applying a convergent set of characterization techniques such as Fourier transform infrared spectroscopy (FTIR), nuclear magnetic resonance (H1 NMR) and X-ray diffraction.

Keywords: *Ultrasound assisted extraction, Polysaccharides, Atractylis gummifera L, Chemical methods, Characterization.*

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COMPARISON OF THE PROPERTIES OF TWO TYPES OF CONCRETES BY NON-DESTRUCTIVE TESTS: INFLUENCE OF THE GEOMETRY OF THE SPECIMENS

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ABSTRACT

Most concrete properties are affected by cement and mechanical properties, and some of the durability properties of cement are determined by cement mortars. However, the applications of ultrasound (non-destructive testing) on the determination of the properties of cement mortars are quite limited whatever the method used. Therefore, the required dimensions of the samples as well as the different types of specimens and concrete have not yet been established for special concretes such as self-placing concretes. In this study, non-destructive testing by determination of ultrasonic pulse velocity (UPV) and destructive testing of two types of concretes (regular concrete and self-placing concretes) were determined with different different frequency transducers for different sample sizes and shapes and the relationships between UPV and various concrete properties were studied. As part of the experimental program, three different ultrasonic frequencies (54, 82 and 150 kHz) were used. To this end, mortar mixtures have been prepared with various water / cement ratios having a constant cement content of 450 kg / m3. Cubic, cylindrical and prismatic samples of different sizes were prepared from each mixture of the concretes studied.

Keywords: *Concretes, SCC, Scale effect; specimen geometry, Compression stress; crushing test; ultrasound*

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EFFECT OF STITCH ON THE MECHANICAL PROPERTIES OF GLASS/EPOXY COMPOSITES

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ABSTRACT

This paper presents an experimental study of the effect of stitch orientation on the mechanical properties and damage mechanisms of Stitched/Unstitched Glass/Epoxy composites laminate. The aim of this work is to study the tensile and flexural 3-point mechanical behaviors of laminated composite materials with stitched and unstitched multi-oriented fibers structure to characterize the interracial cohesion between layers of Glass/Epoxy laminates. Independently an elaboration of the implementation of stratified composite materials for defined and parameterized in order to obtain specimens at different stitching orientations and with the use of different patterns was compared with those of specimens fabricated without the use of the stitching process. The tensile and flexural 3-point experimental analysis of the stitched and unstitched laminate composites has shown that the maximum deflection increases almost twice for 45°/-45° sewn laminate compared to bidirectional and multidirectional laminate composites unstitched. On the other hand, the stress is higher than in the case of the unstitched composite, which becomes stiffer (decrease of the deformation).

Keywords: *laminate Glass/Epoxy, mechanical properties, delamination, tensile, flexural 3-point.*

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EXTRACTION OF GALACTOGLUCOMANNANS FROM ALGERIAN PINUS HALEPENSIS

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ABSTRACT

The effectiveness of extraction in optimal conditions of galactoglucomannans (GGMs) from Pinus halepensis with pressurized hot water extraction was investigated for applications like coatings and films in packaging. For this purpose, optimal molecular masses with high yields are required, presenting a serious challenge for hot water extraction processes. The extraction of GGMs was carried out in an accelerated solvent extractor (ASE) and the isolation was performed by precipitation in ethanol. Three temperatures in the range 160-180°C and five extraction times 5-90 min were tested in order to optimize extraction parameters of GGMs, avoiding thermal and chemical degradation in hot water. Total dissolved solids (TDS) were determined gravimetrically after freeze-drying and weight average molar masses (Mw) were determined by High Performance Size Exclusion Chromatography (HPSEC). Total non-cellulosic carbohydrates were determined by gas chromatography (GC) after acid methanolysis. Free monomers were additionally analyzed by GC. Acetic acid was determined after alkaline hydrolysis of acetyl groups and analyzed by HPSEC. The main parameters influencing the extraction processes of the GGMs, namely, extraction time and temperature were studied.

Keywords: *hot water, GGMs, films packaging, Coatings, Pinus halepensis*

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METAKAOLIN GEOPOLYMER CEMENT USED AS BINDER IN COURSE BASE PAVEMENT

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ABSTRACT

Concrete is the most widely used material in the world after water, with an average consumption of about one tonne per year per habitant. The production of one tonne of cement injects 800kg of CO2 into air environment. Using geopolymer cement can reduce that emission from 60 % until 80%. Public works industry consumes huge amounts of hydraulic binders especially cement, in base course of pavement, using geopolymer as binder in base course of pavement can be of benefit economically and environmentally. This paper study geotechnical characteristics of sand treated by geopolymer cement, geoplolymer cement was an alkali activated metakaolin, metakaolin was obtained by burning a kaolin of Tablbala (400 km from Bechar), and the activator was a mix of glass water and NaOH, the optimum molarity was determined by varying molarity of the activator : 8, 10 and 12 mol. Mechanical property study was done according to NFP 98-230-1. The study was completed by microstructure study using: FRX, XRD and SEM. The results show that, 50 x 100 mm cylinder specimens of sand treated by 8 mol alkali activated metakaolin have a strength nearly 60 kg/cm2 after 28 days, which is interesting result.

Keywords: *sand treatment, base course, metakaolin, alkali activated material, geoplolymer*

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VALORIZATION OF WASTE PAPER IN CEMENTITIOUS CONCRETE COMPOSITES

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ABSTRACT

Faced with the ever-growing need for materials resources and the requirements and conditions for preserving the environment in a vision of sustainable development, it has become necessary and relevant to explore and study all the possibilities and opportunities for reuse and recovery of waste and industrial by-products, particularly in the field of public works. Portland cement concrete will always be the most commonly used building material in the future. As with other industries, the universal need to conserve resources, protect the environment and make good use of energy must be felt in the field of concrete technology. Therefore, the use of waste and by-products for the manufacture of cement and concrete will be of great importance. This work seeks to highlight the possibility of using paper waste as aggregate for hydraulic concrete. The characteristics of the recycled aggregates (paper waste) were analyzed in order to formulate the concretes studied.

Keywords: *Aggregates, Valorization, Environment, Paper Waste, Characterization.*

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MEAN FIELD ANALYSIS OF THE HIGH TEMPERATURE MAGNETIC PROPERTIES OF DYIG IN HIGH DC FIELDS

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ABSTRACT

The recent studies of far-infrared spectra of magnetic excitations on dysprosium iron garnet (Dy3Fe5O12 or DyIG) have revealed a connection with the changes of the static dielectric constant and magnetic susceptibility χ(T) [1]. Below a critical temperature TC = 16 K which coincides with the previous Fe spin reorientation from the easy axis to a low-symmetry angular phase , the Dy-Dy exchange interaction was found not small compared to that for Fe-Dy exchange. This unexpected result differs markedly with other determinations. This work is devoted to the high-field determination of the molecular field coefficients in DyIG at high temperatures (HT). Isothermal magnetization MT(H) measurements were performed in the 125-300 K range on two spherical single crystals in high DC magnetic fields up to 16 T applied along the , and crystallographic directions. No anisotropy of magnetization in MT(H) and no magnetic anisotropy in χ-1(T) are observed. The coefficient of the mean exchange field acting on the Dy moments │n(Tcomp)│= 15.35 µB-1 kOe mol at the compensation temperature Tcomp = 218.5 K obtained experimentally from χ-1(T) and from the line M(Dy) = 0 of the phase diagram is compared with that calculated by using the Brillouin function in the HT approximation [2]. The molecular field coefficient │nDy│ of the Dy-Dy interaction is estimated at 0.43 µB-1 kOe mol and its supposed role is clarified.

Keywords: *magnetizations, rare earths, garnet, Magnetism, magnetic fields.*

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ELECTRODEPOSITION AND CHARACTERIZATION OF NI-CR COMPOSITE COATINGS

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ABSTRACT

In this study, Ni-Cr composite coatings were electrodeposited from citrate bath onto Cu substrates at different values of current densities. The effect of plating current density on morphological and structural characterization of Ni-Cr electrodeposited composite coatings were investigated by means of scanning electron microscopy SEM and X-ray diffraction XRD, respectively. Potentiodynamic polarization and electrochemical impedance spectroscopy EIS tests in 3.5wt % NaCl solution were used to evaluate corrosion résistance of Ni-Cr coatings. SEM images showed that the surface morphology of all coatings contained microcraks and pores. XRD patterns indicate the formation of Ni-Cr and Cr3Ni2 phases. Electrochemical tests show that 3 A/dm² is an optimal value of applied current density in the sense of the least value of Ecorr and the best charge transfer resistance Rp.

Keywords: *Ni, Cr Composite Coatings, Electrodeposition, Electrochemical Impedance Spectroscopy EIS.*

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L'EFFET DU TRAITEMENT THERMIQUE DANS LE COMPORTEMENT THERMO-MECANIQUE DES BPR INCORPORANT DU METAKAOLIN

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ABSTRACT

Le métakaolin, un ingrédient utilisé en substitution au ciment et à la fumée de silice, fait de lui un éco-matériau qui diminue la chaleur d'hydratation. Le métakaolin est introduit dans une formulation optimisée de BUHP, en substitution de sable à différents pourcentages (5%, 10%, 15% et 20%), afin de voir sa contribution à la résistance du matériau sous haute température. Le traitement thermique est considéré comme un moyen d'amélioration des performances mécaniques du béton d'une façon générale, sur ce, le présent travail repose sur le comportement thermomécanique d'un BUHP traité thermiquement, à jeune âge, et voir l'effet de température et la substitution en métakaolin dans les résistances mécaniques de ce dernier, pour deux échéanciers fixés à 28jours et 90 jours. Les résistances mécaniques de ce BUHP, avec le traitement thermique, ont donné des résultats plus performants que ceux obtenus sur les matériaux non traités thermiquement, pour les deux échéanciers. Tous ces bétons, contenant de la silice, présentent une forte réaction pouzzolanique modifiant ainsi la structure des hydrates formés, ce qui justifie les résultats obtenus.

Keywords: *essais mécaniques., chauffage, traitement thermique, Métakaolin (MK), BUHP*

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EVALUATION DE LA PERFORMANCE PARASISMIQUE DES STRUCTURES AUTOSTABLES REHABILITÉES PAR RAJOUT DE VOILES

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ABSTRACT

Les structures contreventées par portiques autostables doivent exposer une capacité de résistance et de déformation adéquate afin de survivre à une excitation sismique. Les bâtiments sont pré-convertis pour les actions verticales uniquement, ils correspondent aux impossibilités de répondre aux exigences préconisées par les codes parasismiques en vigueur. Pour ce faire, ils doivent être réhabilités afin de leur performance structurelle. Dans ce contexte, plusieurs techniques de rééducation peuvent être envisagées. Elles peuvent être classées en deux catégories: solutions en béton armé, interférant sur la rigidité du bâtiment, telles que l'ajout de voiles ou le gainage de poteaux; on the body building on a choisi de coller in the chemisage in steel or bandage by composite in FRP. Le travail présenté dans cet article s'inscrit dans ce cadre. La solution préconisée consiste en une rajout de voiles et une performance parasismique de structure renforcée. La dissipation d'énergie est fournie par une plastification supposée être concentrée sur les éléments linéaires et à la base des voiles en forme de rotules plastiques. Le travail entrepris avec la valeur de la solution a été ajouté, ce qui a permis de mettre en évidence une amélioration nette de la performance structurelle en termes de rigidité, de résistance et de ductilité.

Keywords: *performance structurelle, rotule plastique, réhabilitation, dissipation d'énergie, rajout de voiles.*

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VALUATION OF THE SEDIMENT OF THE DREDGING OF THE BOUHANIFIA DAM AS CONSTRUCTION MATERIAL IN THE MORTARS

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ABSTRACT

Dredge devastation has become an unavoidable alternative today to extend the life of Algerian dams in this case the BOUHANIFIA dam (western Algeria), but these cleaning operations generate considerable quantities of sediment which are stored in the wild with major ecological damage, then the question of the fate of these sediments, to which it is necessary to provide solutions that respect the environment. With a view to sustainable development, the research work carried out aims at studying the feasibility or recovering the treated sediments from the BOUHANIFIA dam by introducing them as partial substitution in the cement at levels of 10% and 15 % for manufacturing of a mortar, which we will then examine to evaluate the effect of these sediments on the mechanical properties of the composite, then we are interested in adhesion, and the study of dimensional variations. The tests carried out gave very encouraging results, promising a better future for the sediments.

Keywords: *Sediments, Valuation, Substitution in cement, Mortar, Adhesion*

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ÉTUDE PROBABILISTE DU PHÉNOMÈNE DÉCRASSEMENT DES GRAINS DANS LES MATÉRIAUX GRANULAIRES

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ABSTRACT

Le comportement des matériaux granulaires sous chargement est très complexe et déficèle à prédire. L'évolution de leur comportement dépend de plusieurs paramètres.La compréhension du comportement de ces martiaux nécessite la définition des différents phénomènes qui sont la source de leur évolution durant le chargement. L'écrasement des grains dans un milieu granulaire est un phénomène très important, il est source de modification mécanique et physique de ces milieux. L'étude statistique des propriétés mécaniques d'un matériau a pour but de caractériser la distribution mécanique de rupture et de quantifier l'évolution de ces distributions avec la taille des échantillons (grains et ensemble de grains). Ce travail, présente les résultats d'une étude expérimentale faite sur l'écrasement des grains de calcaires individuels et d'échantillons formés de plusieurs grains soumis à un chargement uniaxial afin de mettre en évidence l'influence du chargement et de la taille des grains sur le taux d'écrasement de ces derniers. Une étude statistique à partir de la méthode de Weibull a permis de modéliser le problème et de quantifier le taux de cassures pour les deux cas. Les résultats obtenus montrent que le taux d'écrasement est fonction de la dimension des grains et de l'intensité de la charge appliquée. La modélisation statistique en utilisant la méthode de Weibull a donnée des résultats acceptables, pour les deux cas.

Keywords: *chargement, statistique, écrasement, grains, matériaux, uniaxial*

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SYNTHESIS, CHARACTERIZATION, AND SWELLING BEHAVIOR OF PH RESPONSIVE CARBOXYMETHYL CELLULOSE-G-POLY (ACRYLAMIDE-CO-MALEIC ACID) HYDROGELS

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ABSTRACT

Hydrogels are three-dimensional, hydrophilic, polymer networks capable of swelling in an aqueous environment. Stimuli-sensitive hydrogels undergo volume changes in response to external stimuli, such as small changes in temperature, pH, ionic strength, electric field, light and so on.. Carboxymethyl cellulose (CMC) is a representative cellulose derivative with carboxymethyl groups (-CH2-COONa) bonded to some of the hydroxyl groups on cellulose backbone. The polar carboxyl groups promise the cellulose solubility, chemical reactivity and strong hydrophilicity. So the application of CMC in superabsorbent fields has become more and more attractive and promising. The current work focuses on the preparation of a hydrophilic macromolecular matrix by performing graft copolymerization of acrylamide (AAm)/ maleic acid (MA) onto carboxymethyl cellulose (CMC) by using potassium persulfate as a free radical initiator, in the presence of N,Nâ€²-methylenebisacrylamide as a cross-linking agent. The synthesized hydrogels were characterized by Fourier transform infrared spectroscopy (FTIR) and thermogravimetric analysis (TGA). The effects of CMC composition and variation of pH solution on the swelling behavior were studied. The carboxymethyl cellulose-g-poly(acrylamide-co-maleic acid) hydrogels showed a pH responsive behavior. The described hydrogel might have great potential application in drug delivery system.

Keywords: *network, swelling, hydrogel, carboxymethyl cellulose*

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MICROSTRUCTURE AND MECHANICAL PROPERTIES OF A HIGH STRENGTH ARMOUR STEEL

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ABSTRACT

In this work, the mechanical properties and the microstructure of a high strength armour steel was investigated. Whereas, the properties of tensile strength, young modulus, hardness, phase content and microstructure were evaluated after conducting the mechanical tests, XRD analysis, and SEM analysis respectively. An optimum combination of strength and hardness is crucial for an outstanding ballistic performance of the as-received steel. Thereby, the experimental results showed that the present steel exhibits a high yield strength and ultimate of 1055MPa and 1480MPa, respectively. The hardness of the steel was about 661VHN. This increased hardness could be related to the effect of alloying addition upon the steel performance, as clearly illustrated in the Raman spectroscopy analysis which shows chromium with a high intensity corresponding peak. While, the young modulus value of the steel was about 124GPa. Moreover, the present steel exhibits a lath martensitic microstructure. Nevertheless, a coarse structure is clearly observed in some regions of the micrographs.

Keywords: *Mechanical properties, Hardenability, High strength armour steel, Morphology.*

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STUDY OF THE ACCTIVIT OF CHITOSAN BASE ON THE EOSKELETON OF RED SHRIMP IN THE INHIBITION OF ACID CORROSION OF ORDINAR STEEL

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ABSTRACT

In this work we were interested firstly in the chemical extraction of a biopolymers chitosan and their physicochemical characterization; secondly we studied the effect of chitosan on the inhibition of the corrosion of the mild steel in HCl 0.5 M by the gravimetric method. The influence of chitosan concentration, temperature and Immersion time on chitosan inhibitory activity was investigated. The adsorption isotherm was evaluated to explain the mechanism of inhibition and metal-inhibitor nteractions. The results obtained show that chitosan has an interesting inhibitory efficiency of the order of 73.45%, this effectiveness is influenced by the various parameters studied.

Keywords: *efficiency., inhibitor, chitosan, corrosion*

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ETUDE DE LA RÉSISTANCE MÉCANIQUE D'UN SOL LIMONEUX TRAITÉ AU CIMENT ET RENFORCÉ DE FIBRES

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ABSTRACT

La rareté des terrains disponibles et le coût élevé lié à l'utilisation des matériaux de bonne qualité ont mené au besoin d'employer des matériaux locaux dans la construction géotechniques. Cependant, les propriétés géotechniques médiocres de ces matériaux posent beaucoup de difficultés pour les projets de construction et doivent donc être stabilisés aux liants hydrauliques pour améliorer leurs caractéristiques. De plus, les travaux de recherche sur les matériaux renforcés de fibres s'approfondissent pour mieux comprendre le comportement physique et mécanique de ces matériaux en interaction avec le sol. L'objectif principal de ce travail est d'étudier l'effet de l'utilisation des fibres de polypropylène et du ciment sur le comportement mécanique d'un sol limoneux prélevé de la localité Guetna de la région de Télagh, wilaya de Sidi Bel Abbès. Le sol choisit a été caractérisé et mélangé avec les ajouts (ciment et fibres) pour préparer des échantillons renforcés et conversés à l'air libre à plusieurs temps de cure (1, 7 et 28 jours). En se basant sur les résultats expérimentaux de compression et de traction indirecte, il peut être conclu que la présence des fibres a un effet positif sur le comportement mécanique du composite "sol-ciment", par rapport au comportement fragile de la matrice seule.

Keywords: *résistance à la compression, renforcement des sols, ciment, fibres de polypropylène, comportement mécanique, traction indirecte*

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STUDY OF THE STRUCTURAL AND ELECTRONIC PROPERTIES OF HEAVY FERMIONS-BASED COMPOUNDS FOR SUPERCONDUCTING APPLICATIONS

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ABSTRACT

The objective of this study is to investigate the structural and electronic properties of heavy fermion-based compounds to benefit them in superconducting applications. Among the most studied alloys in this field are the semi-Heuslers of general formula XYZ. In the present work, we will study the half heusler ScPdBi compound in the two phases: ferromagnetic (FM) and anti-ferromagnetic (AFM). Subsequently we will illustrate the curves of the structures of the bands to predict the electronic behavior of this material. Due to the presence of heavy fermions, it is necessary to study the effect of spin-orbit coupling on highly correlated orbitals. AFM compounds that contain heavy fermions are good topological insulating candidates. We used the first principle based in DFT implemented in ELK code.

Keywords: *orbit coupling, spin, superconducting, heavy fermions.*

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HYDROGELS WITH ENHENCED ADHESIVE AND RHEOLOGICAL PROPERTIES FOR TRANSDERMAL DRUG DELIVERY SYSTEMS DESIGN

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ABSTRACT

This contribution describes the strategy of a one-layer Transdermal Drug Delivery System (TDDS), device where a hydrogel acts both as a drug delivery system and a Pressure Sensitive Adhesive (PSA), differing from the most well-known TDDS, where the device is essentially comprised of a drug reservoir with a protective outer cover, a permeable membrane, an adhesive, and a release liner. Accordingly, we have synthesized conventional poly(acrylamide-co-hydroxyethyl methacrylate) [P(AM-HEMA)] hydrogels and nanocomposite hydrogels filled with poly(styrÈne-co-butyl acrylate) nanoparticles [P(AM-HEMA)-PSBuA]. PSBuA nanoparticles were synthesized by direct emulsion polymerization. P(AM-HEMA) hydrogels with HEMA content of 10 and 20 mol % and those filled with 26 wt. % of PSBuA nanoparticles were prepared by a free radical polymerization in aqueous medium using N,N'-methylene-bis-acrylamide (Bis) and potassium persulfate as cross-linking agent and initiator respectively. Hydrogels adhesive properties were evaluated when they were applied to different substrates, equivalent human skin and stainless steel, using a probe tack test. These properties were studied as functions of the chemical composition of the hydrogel and the nature of the substrate. The adhesion energy was found to be related to the chemical composition and the rheological properties of the hydrogels which were also evaluated by the determination of elastic G' and loss G"moduli derived from oscillatory shearing measurements performed in the linear domain.

Keywords: *Pressure Sensitive Adhesives, Nanocomposites, Hydrogels, Adhesion, Rheology.*

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ACOUSTIC INVESTIGATION TO DETERMINE THE EFFECTS OF FATIGUE AND AGING ON AN EPOXY GLASS COMPOSITE MATERIAL

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ABSTRACT

In this study, impact of environmental aging conditions on the mechanical properties of glass epoxy was experimentally investigated. The plates of glass fiber with SR 1500 epoxy resin with SD 2505 composite were realized by vacuum molding. Afterwards, plates were cut in the recommended dimensions (200x20x1 mm). Experimental tests were carried out on a standard hydraulic machine INSTRON 8516. The capacity of machine is 100 kN, which can be used for static and fatigue tests. The machine is interfaced with a dedicated computer for data acquisition. In static tests, the specimens were loaded at a constant rate of 1 mm/min. The fatigue tests were performed using sinusoidal type of waveform at a displacement control with frequency of 10 Hz. Traction test were performed after immersion in artificial seawater having a salinity of about 3.7% for various periods which included 20 days in laboratory conditions, at ambient temperature of 20°C. The aging impact on some mechanical properties of this material has been investigated. Degradation of mechanical properties was observed. The results showed that the Young's modulus of plates undergo only minor changes; moisture exposure by immersion in seawater causes only minor degradation. It was also shown that such degradation largely depends on aging immersion duration. The mechanical tests were backed by Acoustic Emission Monitoring (AEM) during the load cycle, in order to understand the nature of the failure process in the composites, such as fiber breakage, matrix crazing, matrix debonding and delamination, etc. The small displacements caused by the energy released by the fracture are detected by three sensors (S1, S2 and S3).

Keywords: *acoustic emission, epoxy, glass fiber, seawater, fatigue*

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CHARACTERIZATION OF NATURAL DIATOMITE POWDER FOR INDUSTRIAL APPLICATION

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ABSTRACT

Diatomite also called Kieselguhr obtained from the Sig deposit located in the westward of Algeria, It is important to know the characteristics of diatomite before using it as a sensor in electronics. In this case, characterization was carried out by chemical, thermal analysis and scanning electron microscope. The results show that crude kieselguhr is formed of several components and in particular silica, alumina and calcium carbonates. It has extremely fine grained and highly absorbent material due to porosity over 72% and has honeycomb like structure. The results obtained by chemical analysis, XRD analysis, optical microscopy and thermal analysis (simultaneous analyses by Differential Scanning Calorimetry (DSC) and thermogravimetry (TGA)), showed the loss of mass when the temperature is increased and revealed that the diatomite has four mass losses and showed different transformation (exothermic and endothermic) at different temperature.

Keywords: *DSC, XRD, Diatomite, TGA*

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SOLUTION OF TWO-COMPONENT AGGREGATION POPULATION BALANCE EQUATION (PBE) FOR SUM KERNEL BY ADOMIAN DECOMPOSITION METHOD (ADM)

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ABSTRACT

The evolution of the particles (coagulating aerosols, crystals, polymers, droplets, ...) and their proprieties is governed by a mathematically formulation namely the population balance equation. In literature several numerical methods were proposed to solve this complicated equation, because its analytical solutions are available in very few cases. In this work we used this equation to describe the aggregation of the particles in batch system with assuming that the one particle consists of two components and the particles aggregate by the additive kernel .We applied the Adomian Decomposition Method to solve this problem, this technique overcomes the crucial difficulties of numerical discretization and stability that often characterize previous solutions in this area. By this method we got the number density function and the first four moments of particle size distribution (total number of particles, total mass of the particles in the system, ...) and we compared them with existing exact solution. The results obtained by ADM technique was infinite power series with appropriate initial conditions. This method was found to produce good approximations to the exact solutions with their rapidly converging series for all the cases studied in this work. The Adomian Decomposition Method is a powerful mathematical tool for solving two-component population balance equation.

Keywords: *Adomian Decomposition Method ADM., aggregation, Population balance equations*

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CRITICAL DESIGN STUDY FOR CONCRETE-FILLED AUSTENITIC STAINLESS STEEL TUBULAR STUB COLUMN

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ABSTRACT

Stainless steel materials becomes more and more suitable in structural engineering, due to the aesthetic appearance, high corrosion resistance, ease of maintenance, high ductility, reuse and recycling capability, as well as ease of construction, one of these families is austenitic stainless steel. Therefore this paper presents a numerical investigation on the behaviour of concrete-filled austenitic stainless steel grade EN 1.4301 (304) tubular (CFSST) stub columns. Accordingly, finite element modelling is constructed herein using Abaqus-6.13 software and validated against obtainable literature results accounting for material nonlinearity, and based on the confined concrete model recently available in the literature, and two-stage version expressing the full-range stress-strain material behaviour of stainless steel developed by Rasmussen. Therefore, for expanding future structural design possibility, the purpose of numerical study is to find an appropriate design for concrete-filled austenitic stainless steel grade EN 1.4301 (304) tubular stub columns by comparing the numerical results with the design specified in design standards such as EN 1993-1-4, ENV 1994-1-1, and other recent proposals. Finding and important conclusions for the design of CFSST stub column are also presented.

Keywords: *1, EN 1993, Finite element modelling, Abaqus, austenitic stainless steel, filled, Concrete, 1*

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LIQUID-LIQUID EXTRACTION OF COPPER (II) BY N- (2-HYDROXYBENZYLIDENE) ANILINE SUBSTITUTED DIFFERENTLY BY METHYL AND NITRO GROUP.

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ABSTRACT

Throughout the development of liquid-liquid extraction, different types of extractants organic were used; these are usually organic compounds with excellent coordination power vis-à -vis the metal ions. N-(2-hydroxybenzylidene)aniline have been used as extractans for the separation and purification of a certain number of metals, in order to their good physicochemical properties such as the acidity which is the most important factor in the extraction technique; so it is very interesting to do a very detailed study on this factor. The study of the influence of pH on the liquid-liquid extraction of copper (II) in a unitary ionic force from sulfate medium by N-(2-hydroxybenzylidene)aniline, and their differently substituted in chloroform, was achieved by establishing the curves log D = f (pH) The speed of the curves obtained makes it possible to establish for each extract its order extraction (fig.1);In the case of the methyl substituent, the extraction follows the following order:2CH3 -SA ~ 3CH3 -SA ~ 4CH3 -SA > HSA

Keywords: *N, substituent effect, liquid extraction, liquid, (2, hydroxybenzylidene) aniline.*

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ANALYSIS OF THE MICROSTRUCTURE AND MICROHARDNESS OF STEEL C45 AFTER LASER BORIDING TREATEMENT

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ABSTRACT

A laser boriding treatment was carried out on C45 iron steel in order to study it's mechanical characteristics after formation of borides layer. In this paper one specimen of C45 iron steel was laser borided using the equipment TRUMPF TLF 2600 Turbo; and another specimen of the same material was only remelting by laser. To use it like model to compare the improvement of mechanical characteristics of this material with carbon borides, which there formed after laser boriding, and without carbon borides. After laser treatment three zones appeared: remelted zone (MZ) near the top surface of the specimen, high affected zone (HAZ) below the (MZ) and substrate material which they were observed clearly with an optical microscope (OM) and scanning electron microscopy (SEM). The microstructure of the remelted zone (MZ) and high affected zone (HAZ) was an eutectic mixture of borides and martensite for the boriding specimen, and mixture of martensite and ferrite for remelting specimen. Microhardness profiles were investigated on cross section along the axis of laser tracks of specimens. The microharness tester equipped with Vickers diamond tip was used and the results were presented on profiles according the distance from the surface. The results of the microstructure and Microhardness affirm the increase of hardness until 600Hv, and also confirm the earlier studies which told about the improvement of mechanical characteristics of steels by boriding.

Keywords: *borides, microhardness, boriding, laser, martensite.*

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ETUDE DU COMPORTEMENT MECANIQUE DES BETONS AUTOPLAÇANTS CONFINES PAR DES GRILLES METALLIQUES, PLASTIQUES ET VEGETALES

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ABSTRACT

Ce travail consiste en une analyse expérimentale de confinement du béton autoplaçant par des grilles composites disposées circonférentiellement tout le long du pourtour des cylindres et totalement intégrées dans la matrice béton. L'objectif principal est de quantifier l'apport en résistance et en déformation que peut confÈre le confinement aux colonnes et son influence sur le mode de rupture sous compression axiale. Neuf mélanges de bétons autoplaçants (BAP) ont été préparés, dont un de référence (BAP non confiné) et huit comportant différents types de grilles (plastiques, métalliques et végétales) avec différentes formes de maille (losange, carré et triangle). Les paramÈtres de formulation à savoir Eau/Liant et Superplastifiant/Liant ont été sélectionnés respectivement 0,4 et 0,9%. Les éprouvettes testées sont de type cylindrique de dimensions 16Ø32 cm. Les résultats obtenus montrent qu'il est possible d'augmenter la ductilité des colonnes, et dans certains cas, leur résistance. Les meilleures performances sont obtenues pour les BAP confinés par des grilles dont la forme des mailles est de losange. Le BAP incluant une grille en fibre d'Alfa de maille carrée (2x2 cm) est le seul qui présente une capacité portance supérieure par rapport toutes les autres compositions. Les modules d'élasticité de toutes les variantes étudiées sont presque similaires à celle du béton non confiné. On a constaté également, lors de l'écrasement que le mode de rupture du béton autoplaçant confiné est trÈs influencé par la présence des grilles.

Keywords: *résistance, grilles composites, confinement, béton autoplaçant, ductilité.*

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SYNTHESIS AND CHARACTERIZATION OF METAKAOLIN-BASED GEOPOLYMER

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ABSTRACT

This study deals with the development and physico-mechanical characterization of a geopolymer cement made from synthetic metakaolin obtained by calcination of an Algerian kaolin and an activation solution. Fourier Transform Infrared Spectroscopy and X-Ray Diffractometry techniques were used to determine optimal calcination and metakaolin synthesis parameters. Baking at 750 ° C for 90 minutes achieved a degree of dehydroxylation of 0.97 sign that the metakaolin obtained is relatively pure. The optimization of the activation solution then made it possible to formulate and elaborate a geo-polymer cement with physico-mechanical characteristics that are clearly preferable to those of industrial portland cement.

Keywords: *Geopolymer, Activation solution, Metakaolin, Portland Cement*

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CONSTITUENT COMPATIBILITY STUDY IN SANDWICH MATERIALS

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ABSTRACT

The present work is part of a comparative study between sandwich epoxy matrix composite materials and different souls namely, cork and honeycomb on the one hand and with different laminates based on carbon fiber and fiberglass, mechanical characterization tests are carried out by three and four point bending, and by shearing according to the modality of the standards in force, different thicknesses of cork core are used, the objective of the work focused on the inspection of the performance of the hybrid sandwiches based on mineral can and natural core, and the compatibility between these constituents, and the influence of the thickness of the core on the mechanical parameters of the sandwich in shear and bending, in order to determine the optimal choice for move towards long-term characterization.

Keywords: *Sandwich, soul, cork, epoxy, compatibility*

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EFFET DES FIBRES DE PALMIER DATTIER SUR LES PROPRIETES DES BETONS AUTOPLAÇANTS

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ABSTRACT

Les bétons autoplaçants (BAP) présentent plusieurs avantages notamment la mise en place sans vibration. Néanmoins, les BAP sont, au même titre que les bétons ordinaires, exposés au risque du retrait et par conséquent à la fissuration. Le fibrage des BAP permet de leur conférer une meilleure résistance à la propagation de la fissuration et d'augmenter leurs résistances mécaniques dans certaines conditions. L'emploi des fibres végétales comme renfort est récent, et est restée timide voir inexistant malgré les multiples avantages économiques, écologiques et techniques que présentent ces fibres. Parmi les fibres végétales les plus étudiées et utilisées, on peut citer le chanvre, la paille, le sisal et le bambou, mais très peu d'études ont été consacrées à la fibre de palmier dattier pourtant très répandue dans le Sud de l'Algérie.Notre travail consiste à introduire les fibres de palmier Dattier dans le BAP avec différentes longueurs, en comparaison avec les fibres de polypropylène. Les résultats obtenus à ce stade qui s'inscrit dans le cadre de travail de thèse de Doctorat, sont encourageant.

Keywords: *fibres végétales, Béton autoplaçant fibrés (BAPF), Palmier dattier, Retrait.*

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PHYSICAL AND MECHANICAL CHARACTERISTICS OF MATERIALS IN THE REGION OF ADRAR: APPLICATION TO COMPRESSED EARTH BLOCKS STABILIZED

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ABSTRACT

The objective of this article is to determine the physico-mechanical properties of stabilized compressed earth bricks (CEBS), made from a mixture of clay with crushed sand, and stabilized by lime. In this study, we first examine the identifying properties of raw materials. Then an experimental study was conducted with cylindrical test pieces of a mixture of clay and crushed sand prepared by the addition of lime and statically compaction, to study the physical and mechanical characteristics of the mixture. The experimental study shows that for use as a building material, the clay mixture with 30% crushed and stabilized sand with 4% and 6% lime is the optimum mixture for as a stabilized compressed earth bricks.

Keywords: *physico, CEBS, lime, crushed sand, Clay, mechanical properties.*

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STRUCTURAL, OPTICAL AND ELECTRICAL PROPERTIES OF UNDOPED SNO2 AND AL-CO CODOPED SNO2 THIN FILMS PREPARED BY SOL - GEL SPIN - COATING TECHNIQUE

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ABSTRACT

Undoped SnO2 and aluminum-cobalt co-doped thin oxide (Al-Co: SnO2) thin films were deposited on glass substrates by sol gel spin coating technique. Cobalt concentration has taken two values 2 and 4 at. % whereas the concentration of aluminum has been fixed at 2 at. %. Effects of Al-Co co-doping on structural, optical and electrical properties of the prepared films were investigated. The films were characterized by several techniques such as x-ray diffraction (XRD), ultraviolet visible (UV-Vis) transmission and four-probe point measurements. XRD study confirmed that all the samples were polycrystalline with tetragonal rutile structure and preferential orientation along the (110) plane. The value of average crystallite size lies within 4.55-6.72 nm and the lattice parameters a and c were affected with Al-Co co-doping. Transmittance spectra indicated a high average transmittance for all films between 80 and 90% in the visible region. The optical band gap of Undoped SnO2 was found 3.83 eV. This value was increased to 3.855 eV and 3.87 eV for Al 2 at.% , Co 2 at.% and Al 2 at.% , Co 4 at.% respectively. Furthermore, the Al-Co: SnO2 thin films displayed low electrical resistivity varies between 8.83.10-3 and 1.97.10-2 Î© cm. thereby, our experimental data may be promising for optoelectronic applications.

Keywords: *spin-coating, Sol-gel, Al-Co codoping, thin films, SnO2*

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EFFET DU DOSAGE ET DE LA REPARTITION DES FIBRES METALLIQUES SUR LE COMPORTEMENT MECANIQUE EN FLEXION DES MORTIERS AUTOPLACANTS FIBRES

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ABSTRACT

Ce travail décrit l'influence du dosage et la répartition des fibres métalliques sur le comportement en traction par flexion des mortiers autoplaçants fibrés. Des essais de flexion trois points ont été réalisés sur des éprouvettes prismatiques de dimensions 40x40x160 mm à l'âge de 28 jours, en faisant varier la quantité (20, 30 et 40 kg/m3) et la répartition des fibres métalliques. Les résultats obtenus ont montré que la résistance à la traction par flexion est d'autant plus importante que le dosage en fibres est important. Par ailleurs, l'effet de la répartition des fibres a été mis en évidence, puisque un gain de la résistance allant jusqu'à 50 % a été obtenu, comparé au mortier autoplaçant sans fibres.

Keywords: *flexion., résistance, Fibres métalliques, répartition, dosage*

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CONTRIBUTION A L'ETUDE D'UN BETON A HAUTES PERFORMANCES A BASE DE LIANT TERNAIRE (CIMENT + FUMEE DE SILICE + LAITIER)

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ABSTRACT

Un béton à hautes performances peut être défini comme tel. Plusieurs travaux scientifiques ont été réalisés, dans l'objectif, les propriétés rhéologiques du béton frais, les performances mécaniques de BHP à l'état durcis. L'ajout d'additions minérales sous forme de charges dans le béton amélioré l'étendu granulaire. Ces ajouts jouent un double rôle: ils jouent à la formation d'hydrates secondaires, grâce à leurs réactions chimiques et à la compacité, à l'effet de remplissage des vidéos et des micros, améliorent ainsi la résistance et la microstructure. Laitier granulé dans le béton permet de l'ouvrir avec un béton conventionnel. La construction du béton à hautes performances utilisant un liant ternaire constitue une nouvelle avancée pour la construction durable qui offre des avantages économiques, techniques et écologiques. This work is a study to the treatment of physics and physics of BHP to base of liant ternaire. BHP to base of liant ternaire (ciment + silice + laitier granulé) présente de bonnes alternatives en matière de performances innovantes et de prévention de la pollution environnementale.

Keywords: *performances mécaniques, maniabilité, laitier granulé, liant ternaire, BHP*

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STUDY AND CHARACTERIZATION OF THE INHIBITORY EFFECT OF AGAVE AMERICANA ON THE CORROSION OF MILD STEEL IN 0.5M H2SO4

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ABSTRACT

The use of inhibitors is one of the most commonly used for the protection of metals from corrosion especially in acidic medium. Oils and plant extracts or grated are increasingly considered as a source of green corrosion inhibitors. In this work, the inhibitor effect of Agave Americana grated (AAG), on mild steel corrosion in 0.5M H2SO4, was investigated by the following methods: stationary electrochemical (potentio-dynamic polarisation) and transitory (Electrochemical impedance spectroscopy (EIS) measurement). Also, the concentration effect on the corrosion process, without and with inhibitor, was studied. Potentiodynamic polarization results shows that AAG act as a mixed inhibitor, and the inhibitory efficiency increases according to the inhibitor concentration's increase up to 76.26% at 2% (v/v). The inhibitor adsorption process is spontaneous and follows the Langmuir isotherm, as well as its molecules are both physisorbed and chemisorbed on steel surface. The inhibitory film formation was confirmed by FTIR and MEB, AFM analyses.

Keywords: *Sulfuric acid, Mild Steel, Agave Americana Grated (AAG), Inhibitor, Corrosion*

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SHEAR WAVE VELOCITY MEASUREMENT IN GRANULAR MATERIALS IN MODIFIED TRIAXIAL CELL

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ABSTRACT

Most soil models used by engineers in geotechnical engineering assume that soil behavior is linear, isotropic and elastic. But in recent years, some characteristics of nonlinear behavior have become more and more interesting to researchers, and it has become important to study and quantify the factors that influence such behavior. The determination of the mechanical properties of granular materials, particularly soils, in the small strain domain, involves the measurement of shear wave velocity using piezoelectric transducers (bender elements) incorporated in test apparatus, such as triaxial is very reliable and reproducible. Nevertheless, notable errors are frequently encountered during laboratory experiments, particularly in in the small strain domain. In addition, a significant variation can be attributed to the simple fact that the time of flight is a very small magnitude, and any biased measurement in the test can easily increase or decrease the value of the measurement. In this paper, we highlight a number of phenomena hindering the proper estimation of the time of flight, and consequently the shear wave velocity during tests with bender elements, namely the near-field effect which is one of the most widespread. In addition to the phenomenon of electromagnetic coupling known as crosstalk. In order to carry out this work, wave propagation tests with a modified triaxial test were carried out on high silica sand samples with small subangular particles (0.2 to 0.6 mm). These cylindrical samples of sand are subjected to different levels of isotropic confining stress and excited by pulses generated and received by a pair of bender elements (transmitter and receiver). The transmitted and received signals are then analyzed to identify the information system of the tested material. The results showed the possibility of effectively controlling the near-field effect, especially based on the choice the excitation frequency.

Keywords: *field effect., Near, time of flight, Triaxial cell, Bender elements, Shear wave velocity*

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EFFECT OF INITIAL SUCTION ON THE HYDRAULIC CANODUCTIVITY OF AN ALGERIAN WASTE LANDFILL LINING

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ABSTRACT

This article investigates the relationship between the initial matric suction and hydraulic conductivity (saturated and unsaturated) and the water retention curve were controlled during a laboratory test. Three materials were used during this study: bentonite and two types of geomaterials (tuff and crushed sand) for use as landfill liners. First, the mixture of 10% bentonite-20% crushed sand - 70% tuff was selected on the basis of the minimum saturated hydraulic conductivity (ksat) by oedometric and triaxial tests. The results showed that the effect of the initial variation in suction from 0.4MPa to 1.5MPa does not make a difference in the ksat values; the values are between 10-8 m/s and 10-11 m/s. Then, the effect of the initial suction on the water retention curve was studied using suction control methods. The water retention curves showed that the air entry value (AEV) increases with decreasing initial water content and that an AEV for micropores is about 40 MPa for all curves. The unsaturated hydraulic conductivity (Kw) study with different initial suction was measured with an original vapor equilibrium technique (VET). The results showed that the Kw varied between 3x10-17m/s and 4x10-15m/s in all cases of the initial suction over a 90-day period. In addition, the Van Genuchten hydraulic conductivity model is compared to the experimental results. Results measured showed a high affinity with the van model. This allows a kw(s) function to be established over a large range of suction. Finally, the effect of the initial suction on the saturated and unsaturated hydraulic conductivity of this mixture is not apparent for the much lower (Sr>80%, k=ksat) and very high suction values, respectively.

Keywords: *hydraulic conductivity., crushed sand (CS), bentonite (B), tuff (T), water retention curve (WRC)*

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DIMERIC SPIN-CROSSOVER OF BIS(PYRAZOLYL)PYRIDINE COMPLEXES OF FE(II): X-RAY CRYSTALLOGRAPHIC STUDY

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ABSTRACT

Research efforts into the spin-crossover phenomenon have reached new heights recently, as industrial applications (memories, optical devices, etc.) seem to be quite near athand. Obviously, the possibility goes through a deeper understanding of the physics involved, and various research groups have focused on increasing this understanding, more specifically on relaxation processes of metastable states and cooperativity effects. Chemists are feeding this effort through the design and synthesis of novel molecules, and on-going efforts are directed towards the synthesis of oligonuclear complexes, which can show behavior not accessible to mononuclear or 1D, 2D, and 3D structures. One of the obvious difficulties of such a project is the very sensitivity of the spin-crossover phenomenon to slight changes in the formulation, the geometry, the crystal packing, and the synthetic procedure. A dinuclear iron(II) complex containing the bridging ligand 4,4' bipyridine (bpy) has been synthesised and characterised by single-crystal X-ray diffraction, magnetic susceptibility and Mossbauer spectral methods. Variable temperature magnetic susceptibility, and X-ray crystallographic studies are described on two structurally similar families of dinuclear iron(II) spin crossover (SCO) complexes of formula{[Fe(NCS)2(bpp)]2(bpy)}. Structural analysis at each of the three plateau temperatures has revealed a dinuclear molecules with spin states HS-HS, HS-LS and LS-LS (HS:high spin, LS: low spin). Structural characterisation of this material reveals subtle changes to the coordination geometries at each of the iron(II) centres and striking change to the local environment of the dinuclear complex.

Keywords: *dinuclear ; iron (II) ; Mössbauer ; X ; ray Crystallographic ; magnetism.*

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COMPORTEMENT MECANIQUE ET HYGROTHERMIQUE DES PLAQUES EN COMPOSITE HYBRIDE

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ABSTRACT

Ce travail a pour objectif d'analyser le comportement mécanique et hygrothermique de composites stratifiés à fibres hybrides en utilisant d'une part, une théorie d'ordre élevé à quatre variables qui prend en considération l'effet de cisaillement transverse lors du calcul des déformations ; et d'autre part une analyse par la méthode des éléments finis. L'équation du mouvement de la plaque stratifiée est obtenue en utilisant de principe d'Hamilton. Les expressions mathématiques sont obtenues en utilisant la solution de Navier pour différentes conditions aux limites,les propriétés mécaniques sont obtenus en utilisant la loi des mélanges. Afin de valider les modèles proposés nous avons d'abord comparé nos résultats avec des modèles existants dans la littérature pour les matériaux non hybrides. Ensuite, nous avons étudié les effets des dimensions de la plaque, de la fraction volumique et du type de fibres, de la position des couches (pour le cas de l'hybridation intercouche) ainsi que les conditions aux limites sur les fréquences fondamentales des plaques composites hybrides. Comme il n'y a aucune donnée disponible dans la littérature pour les plaques composites hybrides, la solution en éléments finis a été utilisée pour valider les résultats obtenus par la théorie d'ordre élevé. Les résultats montrent la bonne précision de la solution analytique proposée pour la prévision des fréquences fondamentales des plaques stratifiées hybrides. Nous avons étudié les effets de température et de l'humidité sur la stabilité des plaques composites hybrides. Les résultats obtenus pour les fréquences fondamentales montrent que les conditions hygrothermiques affectent le comportement des plaques composites mais à moindre échelle.

Keywords: *Plaques composites hybrides, théorie des plaques d'ordre élevé, vibrations libres, méthode des éléments finis, effets hygrothermiques.*

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BENEFICIAL EFFECT OF INCORPORATION OF SLAG ON THE HYDRATION HEAT, MECHANICAL PROPERTIES AND DURABILITY OF CEMENT CONTAINING LIMESTONE POWDER

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ABSTRACT

This paper presents the experimental results of a wide research program, tending to determine the hydration heat mechanism, mechanical properties and durability performance in ternary cement containing limestone powder and blast furnace slag. The limestone powder increase of hydration heat of cement at early ages inducing a high early compressive strength, but it can reduce the later strength due to the dilution effect of limestone powder. On the other hands, the Granulate Blast Furnace Slag (GBFS) contributes to increase the compressive strength of mortars at later ages. Hence, at medium blended cement (OPC-LP-GBFS) with better performance could be produced. Results in this research show at an early age the limestone powder, increase the hydration heat degree and the compressive strength. At later age the Granulate Blast Furnace Slag is very effective in producing ternary blended cements with similar on higher compressive strength than the cement containing the limestone powder addition (CEM II/A 42.5) at 28 and 90 days. For durability performance, the incorporation of the Granulate Blast Furnace Slag into the limestone cement improves remarkably resistance effect to attack by acids and sulfates and it has been found, that the durability of the cements never depends on the mechanical strength properties.

Keywords: *Hydration heat, Compressive strength, Mortar, Mineral addition, Sulfate attack, Acid attack.*

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FORMATION, CHARACTERIZATION AND CORROSION PROTECTION EFFICIENCY OF 2-AMINO-3-MERCAPTO-PROPANOIC ACID FILMS ON COPPER FOR CORROSION PROTECTION

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ABSTRACT

The morphology of copper substrates in aggressive media and the film formation of 2-amino-3-mercapto-propanoic acid on the copper surface were proven by scaning electron microscope (SEM) coupled with EDX (energy dispersive X-ray detector). Surface roughness was measured by atomic force microscopy (AFM). Results obtained by SEM show that the copper surface is strongly damaged in the absence of inhibitor due to the excessive metal dissolution in aggressive solution. A large number of pits and cracks distributed over the surface are appeared, when the copper surface is treated by 2-amino-3-mercapto-propanoic acid, the surface looks much better. This indicates that the inhibitor molecules hinder the dissolution of steel by forming a protective film on its surface which provides remarkable prevention against corrosion. EDS analysis showed the contribution of the organic nature of film formed with a large amount of nitrogen (4.44%), which associated with the contribution of the amine. The roughness parameters were lower than those obtained in the absence of inhibitor.

Keywords: *EDX, SEM, copper modification, copper, AFM.*

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MECHANICAL AND DURABILITY PROPERTIES OF ALKALI-ACTIVATED MATERIALS BASED ON GLASS POWDER

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ABSTRACT

The production of Portland cement produces a high level of carbon dioxide, which is a danger to the environment. To reduce the footprint of cement, new binders have been developed, namely alkali-activated binders. These binders are prepared using chemically activated aluminosilicate materials such as slag, fly ash, and glass powder. Glass recycling is an ecological gesture that reduces CO2 emissions, saves energy and reduces the consumption of raw materials. This article presents a critical study on materials based on activated glass powder without or with slag extracted from some previous studies. The properties studied are compressive strength, and durability : porosity, water absorption, expansion with respect to time due to alkali silica reaction and chloride penetration. The influencing factors areÂ : the type of activator, the activator concentration, the fineness of the glass powder, the percentage of the glass powder and the ratio (liquid/solid). The main advantages of activated glass powder have a beneficial effect on mechanical properties, especially in the long term. Thus, in terms of durability : The fine glass powder improves the durability of the blends by reducing their penetrability, reduces the expansion due to RAS, sulfate and permeability to chloride ions. Finally, due to the presence of high alkali content in the glass, its activation requires a moderate concentration of NaOH.

Keywords: *resistance, activated binders, glass powder, durability*

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APPLICATION OF COPPER THIN LAYER ELECTRICAL RESISTANCE SENSOR FOR CORROSION MONITORING IN AGGRESSIVE ENVIRONMENTS

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ABSTRACT

Corrosion is a major problem in the industry that could pose a potential danger to the environment and the economy. In this context, the monitoring of corrosion is essential. Several methods of monitoring corrosion have been proposed in recent decades. Due to its high sensitivity and robustness, the electrical resistance technique was chosen to perform this monitoring. This technique is used to measure the weight loss of a thin metal layer resulting from a change in electrical resistance. Our objective is to elaborate a sensor based on the electrical change of a thin layer of copper that allows following the corrosion according to the principle of the electrical resistance method. This last approach allowed us to follow the corrosiveness of aggressive environments such as HCl, H2SO4 and NaCl depending on the temperature. The results of studies show that the electrical resistance sensor is a reliable and promising tool that not only applies to corrosion monitoring of metallic materials but also to classify environments according to their corrosivity.

Keywords: *Electrical resistance, Sensor, Monitoring, Corrosion, Thin layer*

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EFFETS DES INCERTITUDES SUR LA CONCENTRATION DE CONTRAINTES DU MATERIAU COMPOSITE

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ABSTRACT

Cet article définit l'analyse de l'incertitude et les différents types et sources d'incertitudes sur la concentration du matériau composite. Analyse de sensibilité globale de Sobol est notamment envisagé dans le cadre d'une étude de fiabilité, de la méthodologie globale de traitement des incertitudes ou encore en conception robuste. Cette analyse consiste à identifier et quantifier la contribution des paramètres d'entrée d'un modèle à la variabilité de sa sortie. Analyse de sensibilité globale de Sobol basée sur la variance a été utilisée pour déterminer la contribution des paramètres d'entrée sur la concentration de contraintes du composite unidirectionnel en carbone époxyde. Cette analyse comprend l'effet principal, l'effet total et l'effet de l'interaction paramétrique de chaque paramètre d'entrée. Les paramètres d'entrée considérés sont le module d'Young des fibres , le module d'Young de la matrice , la contrainte de cisaillement , la résistance de référence fibre , le paramètre de transfert de cisaillement et la fraction volumique de fibres . Un même paramètre peut être considéré comme déterministe ou probabiliste en fonction du paramÈtre de sortie analysé. Cette analyse de sensibilité permet de distinguer les paramètres de modélisation qu'il est nécessaire de mieux maitriser et elle autorise aussi un allègement du coût numérique par une réduction du nombre de paramètres, et donc de la dimension du modèle, en éliminant ceux ne contribuant pas à la variabilité de la réponse. Les résultats de l'analyse de sensibilité par la méthode de Sobol, indiquent que la fraction volumique de fibres, le paramÈtre de transfert de cisaillement et la contrainte appliquée ont le plus grand impact sur la concentration de contraintes du composite unidirectionnel en carbone époxyde.

Keywords: *Sobol, analyse de sensibilité, Incertitudes, matériaux composites. sur trois lignes maximum*

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GROWTH KINETICS OF FEB AND FE2B LAYERS ON AISI M2 STEEL BY THE INTEGRAL METHOD

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ABSTRACT

The present work aims at simulating the boriding kinetics of AISI M2 steel by using the integral method with consideration of boride incubation times. This kinetic approach is based on solving of DAE system resulting from the integral method in the temperature range 1173-1323 K. By using a simple approach based on a particular solution of DAE system, the values of boron diffusivities in the FeB and Fe2B layers were estimated. The values of activation energies for boron diffusion in AISI M2 steel were also determined. Finally, a comparison was made between the simulated thicknesses of FeB and Fe2B layers and the experimental values obtained at different temperatures for a treatment time of 10 h.

Keywords: *Integral method, Fick's laws, Incubation times, Keywords: Boriding, Kinetics.*

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REHABILITATION DES POUTRES E-FGM SOUS CHARGEMENT DE FLEXION

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ABSTRACT

Une nouvelle méthode connue pour les poutres renforcées consiste à coller des plaques de composites (FRP) comme renfort. Un mode de rupture important pour ces types de renforcement est le délaminage de la plaque, ce délaminage est dû aux contraintes très concentrées au niveau de l'interface auprès des bords (Effets de bords). En conséquence, les prédécesseurs ont développé plusieurs méthodes analytiques pour prévoir les performances des structures dégradés.D'une part dans ce travail, une analyse théorique des contraintes d'interface est présentée, en incluant le paramètre d'inhomogénéité β pour les poutres FGM simplement appuyées et renforcées par une plaque FRP mince.Les résultats sont raisonnablement conformes à ceux des solutions existantes dans la littérature. L'influence du paramètre d'inhomogénéité est très remarquable dans les résultats des contraintes d'interface.Une étude paramétrique a été entreprise pour étudier la sensibilité des comportements d'interface aux paramètres telle que, la rigidité et l'épaisseur de la couche d'adhésif et la plaque de renforcement.

Keywords: *poutre FGM, plaque FRP, Contraintes d'interface, Renforcement*

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INFLUENCE OF THE TREATMENT OF FIBERS OF PALMIER DATTIER ON THE MECHANICAL PROPERTIES OF CONCRETE OF FIBERS

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ABSTRACT

The purpose of this article is to improve the surface of date palm plant fibers incorporated in concrete as well as the interface section (fiber-concrete) in the fresh state and in the hardened state to increase homogeneity, workability and the cohesion of the fiber concrete in addition to improving mechanical tensile strengths especially to compression by chemical, thermal and acetylating treatments. The fibers used are vegetable fibers leaflets in the palms of palm date of the region of Bechar (Algeria). These fibers have a green color and a variant rectangular section of 5.61 to 7.12 mm², a density of 1540 Kg / m3 and water absorption coefficients after 24 hours of 182%. The length of the fibers used in this study is equal to 60 mm with a percentage of 0.5% volume of the gravel used.

Keywords: *Plant fibers, plant fiber surface, vegetable fiber treatment, plant fiber concrete, date palm fiber.*

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REINFORCEMENT OF BUILDING PLASTER BY WASTE PLASTIC FIBER

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ABSTRACT

Plaster is a building material widely used in finishing buildings work, known for its qualities, which allow it a growing demand in the construction market; it is a favorable material to protection of the environment, very malleable, low density, also its thermal and sound insulation, regulator of the hygrometry of the enclosures and decorative, but the fragility of plaster poses a problem in design of decorative pieces with a langue size dimension, which causes problems for the users; in this study the plaster will be reinforced by fiber from waste plastic and powder glass, by introducing ratio (1 and 2 % for plastic fiber and 5 and 10 % of glass powder) of the introducing volume of reference specimens plaster studied. The results shows the positive effect of the introducing the waste plastic fiber and glass, that the results shows increasing the values of stress in flexion testing of reinforcing plaster beams, and also improving of the fragile behavior, in the other hand including waste glass has improving too the density of various comparing in to reference plaster beam.

Keywords: *Construction Plaster. plastic fiber. glasses powder. stresses of rupture.*

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STUDY OF THE STRUCTURAL, OPTICAL AND ELECTRICAL PROPERTIES OF MN DOPED NIO THIN FILMS SYNTHESIZED BY SOL-GEL SPIN COATING METHOD.

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ABSTRACT

Undoped and manganese (Mn) doped nickel oxide (NiO) thin films were prepared by the sol-gel technique combined with spin coating on glass substrates. Mn was introduced With different concentrations of 0,1 and 2 at.% .The structural, optical, and electrical properties of the prepared films were investigated by X-ray diffraction, UV-visible spectroscopy and four-point prope method. All films are polycrystalline with a cubic-type structure and have a preferential orientation according to the direction <111> at 2θ=37,33. Where X-ray diffraction was able to calculate the values of network parameters, the variable values were 4,167; 4168; 4168 A° for samples pure NiO, 1 at.%, and 2 at.% manganese, Respectively. That the crystallite size of the deposited thin films, calculated using Debye-Scherer formula, was found in the range between 12,76 and 19,76 nm. These thin films showed a high transmittance (80%) in the visible wavelength area of 300 to 800 nm. The optical band gap of NiO film samples can be calculated by plotting versus photon energy (hv), whose values were 3.64, 3.63, and 3.66 eV for pure nickel oxide and anesthetic at 1at%, and 2 in. %. The conductivity measurements had revealed that the highest conductivity value of about 0.277 (Ω.cm)-1 .cm was obtained for Mn 2 at.% concentration.

Keywords: *Mn doped NiO, Spin coating, Sol-gel, Nickel oxide, Thin films, X, ray.*

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EFFET DES FIBRES DE DIFFERENTES NATURES SUR LE COMPORTEMENT THERMOMECANIQUE DES BETONS AUTOPLAÇANTS EXPOSES A HAUTE TEMPERATURE

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ABSTRACT

En situation d'incendie, les structures en béton peuvent présenter au-delà d'une certaine température des instabilités thermiques caractérisées par l'écaillage et l'éclatement, voir manifester un comportement explosif. Pour remédier à cela, l'association des fibres avec les bétons parait comme solution prometteuse. Notre travail consiste à apporter une meilleure compréhension des phénomènes mis en jeu dans les bétons autoplaçants exposés à haute température, ainsi à étudier l'effet des fibres de différentes natures vis-à-vis au comportement thermomécanique de ces bétons. A cet effet, quatre compositions de bétons autoplaçants ont été formulées de même rapport E/C=0.55: bétons autoplaçants témoins sans fibres ,bétons autoplaçants renforcés des fibres de polypropylène, bétons autoplaçants renforcés des fibres d'acier, et bétons autoplaçants renforcés de fibres mixtes (polypropylène et acier). Ces bétons ont été confectionnés dans des éprouvettes prismatiques (7×7×28) cm3 et conservés dans l'eau pendant 28 jours,puis ils ont été soumis à différents cycles de chauffage à une vitesse de 5°C/min jusqu'à une température de palier de :(400°C, 600 °C et 800°C). Des analyses ont été faite sur leurs performances mécaniques, physiques et sur leurs microstructures.

Keywords: *instabilité thermique, haute température, fibres, bétons autoplaçants, propriétés mécaniques résiduelles.*

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STUDY OF THE MECHANICAL PROPERTIES OF A REACTIVE POWDER CONCRETE CONTAINING FIBERS

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ABSTRACT

The reactive powder concretes (RPC) are new concretes with a particle diameter of not more than 600 Î¼m and very high compressive and tensile strengths. The present work consists, for this new generation of micro-concretes, in obtaining high initial and final mechanical performances using local materials. To this end, we have incorporated in Portland cement, materials rich in silica (slag, silica fume and quartz). The results obtained from the tests carried out on the RPC show that: The compressive and bending tensile strengths increase during the incorporation of the additions, thus reflecting the improvement of the compactness of the mixtures by the pozzolanic effect of the latter. By eliminating the granular phase in the RPC and the abundance of sand dune (southern Algeria) and slag (industrial waste iron ore blast furnace), the use of RPC will, in Algeria, meet to both economic and ecological requirements.

Keywords: *flexural strength, compressive strength, Reactive powder concrete, Silica fume, Quartz.*

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ELABORATION ET CARACTERISATION DE COMPOSITES HYBRIDES A MATRICE THERMODURCISSABLE ET RENFORTS LAMELLAIRES

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ABSTRACT

De par leurs caractéristiques physicochimiques, leurs propriétés thermiques, mécaniques et leurs larges gammes d'applications, les composites hybrides à base d'une charge lamellaire se sont imposés dans notre vie quotidienne. Dans le cas d'un assemblage de deux structures organique-inorganique ces nanomatériaux hybrides peuvent être exposés à une altération importante de leurs propriétés. Les effets de ce fusionnement sont reliés à la notion d'interaction covalente ou non covalente. Dans le cadre de cette étude, l'accent a été porté sur l'utilisation de l'oxyde de graphène comme nanomatériau prometteur pour étudier les phénomènes qui interviennent afin d'améliorer le comportement mécanique, thermique ou morphologique d'un polymère thermodurcissable. Les résultats de l'UV-visible, FT-IR, ATG et MEB obtenus dans la partie d'hybridation montrent la grande compatibilité, stabilité thermique et morphologique des matériaux hybrides. Dans la seconde partie, les résultats de l'FT-IR, ATG, angle de contacte et l'essai de traction montrant le phénomène dépendances comportementales des nanocomposites hybrides envers la présence des nanocharges hybrides sur leurs propriété structurales, thermiques et mécaniques. Finalement, la comparaison des résultats obtenus dans le cas des nanocomposites hybrides à base d'un polymère thermodurcissable ont été évalué afin de mettre en évidence le rôle joué par les charges lamellaires hybrides et les conditions de mise en œuvre sur les différentes propriétés de ces matériaux composites.

Keywords: *thermodurcissable, matériaux hybrides, L'oxyde de graphÈne, nanocomposite.*

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STUDY OF THE STABILIZATION/SOLIDIFICATION OF OILY PETROLEUM SLUDGE BY SCANNING ELECTRON MICROSCOPY, DIFFRACTION OF X-RAYS AND COMPRESSIVE STRENGTH ANALYSIS

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ABSTRACT

Today, environmental pollution by crude oil and its fractions has become a major concern in the world, as it is the main cause of ecological and social damage. The terms petroleum sludge or oily sludge refer to the waste generated from crude oil refining industry and oil transportation or storage process. The terms petroleum sludge or oily sludge refer to the waste generated from crude oil refining industry and oil transportation or storage process. The objective of this study was to evaluate oily petroleum sludge stabilized and solidified with an ordinary Portland cement matrix by analysis tests Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD) and Compressive Strength analysis. This research examines the influence of the addition of an oily petroleum sludge on the structure cementitious material. This work was divided into two main steps. In the first stage, the preparation of the specimens composed of sand, cement and oily petroleum sludge and the second stage was to evaluate the stabilization/solidification process via mechanical strength, XRD and SEM analysis. The results shows that the mechanical strength decreases as the amount of oily increases. The SEM and XRD identified the presence of the main products of the reactions of cement hydration (portlandite, calcium silicate and ettringite). This results showed that the addition of the oily petroleum sludge interfere the hydration reactions of cement.

Keywords: *Stabilization/solidification, Oily petroleum sludge, mechanical strength, X, ray Diffraction, Scanning Electron Microscopy*

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EFFECT OF POTASSIUM DICHROMATE ON THE CORROSION INHIBITION OF API N80 STEEL

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ABSTRACT

Electrochemical corrosion inhibition of steel die casting API N80 in albian water (aquifer water) has been studied sing different electrochemical techniques. The inhibition efficiency (IE%) of Potassium dichromate system in controlling corrosion of API N80 steel in albien water. Data obtained from Tafel plot showed that K2Cr2O7 could act as a mixed-type inhibitor with a reasonable protection efficiency of ~89 % at 70 ppm. The results of impedance spectroscopy (EIS) confirm formulation consisting of 70 ppm of K2Cr2O7provides 88 % of inhibition efficiency. The adsorption behavior of the Potassium dichromate (K2Cr2O7) constituents on carbon steel surface was well described following Langmuir adsorption isotherm. Langmuir adsorption isotherm was found to fit well with the experimental data.

Keywords: *corrosion, Potassium dichromate (K2Cr2O7), API N80 steel, Albian water.*

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EFFECT OF TEMPERATURE ON MICROSTRUCTURE AND CORROSION RATE OF API N80 CARBON STEEL

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ABSTRACT

Recently, Pipeline corrosion is a major problem facing many oil and gas industries today because of the enormous downtime associated with corrosion related failures. In this study, the effect of tempering temperature (200, 400 and 500 °C) on the corrosion behavior of American Petroleum Institute (API) N80 steel in albian water at different gradient temperatures (0, 3, 9 and 16 °C) were investigated using X-ray diffraction (XRD), the electrochemical measurements combined with hardness test. XRD patterns have shown that the API N80 steel samples crystallize in ferrite type structure with a strong (110) orientation. We remarked that all samples the N80 are a nanometric grain size, the values of grain sizes given in the range from 211 to 450 Ã…. Corrosion rates of samples are correlated with structural changes (grain size, strain) in samples with increasing tempering temperature. Steel N80 with higher tempering temperature exhibited excellent corrosion resistance with lower corrosion current density. The distinction of corrosion resistance can be attributed to increased grain sizes and decreased residual stress and hardness.

Keywords: *Corrosion, tempering temperature, API N80, hardness.*

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ETUDE DE L'INFLUENCE DE LA SUBSTITUTION DE POLYSTYRENE EXPANSE DANS LE SABLE SUR LE COMPORTEMENT PHYSICO-MECANIQUE DE MORTIER

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ABSTRACT

Dans cet article, les propriétés mécaniques et physiques telles que la résistance, l'absorption d'eau, la légèreté et la microstructure du mortier léger structurel en polystyrène expansé (EPS) ont été examinées. Le remplacement du sable par le polystyrène expansé se fait selon différents pourcentage (10, 20, 30 et 40%) en volume, cette substitution a entraîné une diminution de la résistance à la compression et une augmentation de l'absorption d'eau. la résistance à la compression a diminué d'environ 10 à 15% et l'absorption d'eau a augmenté d'environ 15 à 20%. une bonne adhésion entre les billes de PSE et d'autres composants du mortier a été créée, comme le confirment les images au MEB des spécimens.

Keywords: *polystyrène, propriété mécanique, légèreté, absorption d'eau*

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ELABORATION OF A TRANSDERMAL DEVICE BASED ON BIOPOLYMERS FOR PHARMACEUTICAL USE

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ABSTRACT

The aim of this present work is the development of a transdermal anti-inflammatory patch containing Chitosan and Carrageenan for pharmaceutical use. Initially, the Kappa-Carrageenan is mixed with the Chitosan in order to combine the characteristics of both biopolymers. This association had as consequences the spontaneous formation of a polyelectrolyte complex (PEC) following the ionic crosslinking. The conductivity and turbidity measurements showed an optimal ratio KC/CS of 1/1 v/v. The analysis of the complex formed by FTIR spectroscopy confirmed the reaction between the two biopolymers. Secondly, the preparation of a polyelectrolyte membrane has been realized. The formed membrane had a heterogeneous appearance. Finally, a preliminary study of the release kinetics of Piroxicam showed that the membrane of the PEC is a promising candidate for a prolonged release of Piroxicam.

Keywords: *Chitosan, Carrageenan, polyelectrolyte complex, transdermal patch.*

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FRESH AND HARDENED PROPERTIES OF STEEL FIBER REINFORCED CONCRETE: CASE OF CRIMPED AND HOOKED-END FIBERS

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ABSTRACT

The present study put in evidence the effect of fibers type (crimped and hooked-end steel fibers and volume fractions on a fresh and hardened state of steel fiber reinforced concrete (SFRC). The main characteristic of the fresh composite which is looked for, is the workability provided by crimped and hooked-end steel fibers. Concerning the hardened composite, compression and flexion strengths are focused in relationship with fiber type and their volume fraction content. 28 day tests were carried out: compression testes on cubic specimens with dimensions of 150X150X150 mm and four-point bending testes on prismatic specimens with dimensions of 70X70X280 mm, by adding fibers in different volume fractions (0,5%, 1%, 1,5%, and 2%). The results show that both crimped and hooked-end steel fibers improve the tensile strength. Moreover, the volume fraction is increased, while they have no significant effect on compressive strength.

Keywords: *Flexion and Compression Strengths, end Steel Fiber, Hooked, Crimped Steel Fiber, Steel Fiber Reinforced Concrete, Workability*

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INFLUENCE OF CALCIUM CARBONATE ON THE RHEOLOGICAL BEHAVIOR OF A CRUDE OIL-BASED DRILLING MUD

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ABSTRACT

The drilling mud, which was originally considered only as a vehicle for transporting drilling debris to the surface is now recognized as one of the major factors for the success of a drilling operation. In this paper, we synthesize the results of our research on the rheological properties of crude oil-based drilling mud; we are particularly interested in showing the importance of the influence of the calcium carbonate concentration. We have deduced that the modification of the calcium carbonate concentration does not modify the rheological behavior of the fluid because the flow curves of the different drilling muds studied were analyzed by the Herschel-Bulkely model. We have shown for all the concentrations that the yield stress does not modify very much, the consistency K is low and almost constant and the flow index n is almost fixed, so the increase of the calcium carbonate will have a stronger influence on the consistency index, this alourdissant will have to increase the density of the drilling mud without changing its viscosity too much.

Keywords: *rheological behavior, Calcium carbonate, crude oil and drilling mud.*

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CONTRIBUTION EXPERIMENTALE DE L'EFFET CONJUGUE DES AJOUTS CIMENTAIRES SUR LE COMPORTEMENT DES BAP

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ABSTRACT

Les ajouts cimentaires sont largement utilisés dans la production des ciments à travers le monde, en faisant varier leurs pourcentages, on pourrait obtenir en fonction des domaines d'utilisation différents types de ciments avec des propriétés physico-mécaniques demandées. L'étude entreprise dans ce travail vise à étudier l'action synergique des additions simultanément ajoutés au ciment par substitution. Les ajouts cimentaires sont en général des poudres fines actives ou inertes, introduites dans la composition des ciments dans la perspective, de réduire le coÃ»t de production, diminuer les émissions de CO2 et améliorer les propriétés des bétons. Les ajouts utilisés dans ce travail sont le calcaire, le laitier de haut fourneau et la chamotte qui sont ajoutés simultanément dans la formulation des BAP en gardant le mëme étalement et en faisant varier le pourcentage d'adjuvant qui est un superplastifiant, tout en gardant le même squelette et un dosage en eau fixe. Une comparaison entre les bétons avec ajouts cimentaires ainsi formulés et le béton témoin est établie pour définir l'effet de ces ajouts sur les différentes propriétés physico-mécaniques. On a constaté, que cet effet synergique a un apport positif sur les propriétés intrinsÈques des bétons autoplaçants.

Keywords: *Béton, BAP, Ajout, Calcaire, Laitier, Chamotte*

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3D NUMERICAL ANALYSES OF PILE RESPONSE DUE TO EXCAVATION-INDUCED LATERAL SOIL MOVEMENT

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ABSTRACT

In urban areas, the construction of high-rise buildings sometimes requires deep excavations. The excavation will cause large soil movement and inevitably affects the performance of adjacent deep foundations so cause damage to the building rested on. Several researchers developed to asses responses of piles near to deep excavation (analytical method, centrifuge model tests). In this paper, a 3D numerical study was carried out to investigate the effects of deep excavation construction on nearby pile foundation using PLAXIS 3D finite element software. The numerical model was verified based on the results of a centrifuge test where there is good agreement between the trend of the results of the centrifuge test and the present model. Using the numerical model, a parametric study was performed to study the effect of sand density, wall stiffness, and the pile stiffness, pile head condition and effect of adding strut on the pile response are also investigated. This study shows that deep excavation induced significant bending moments and lateral deflections in the pile.

Keywords: *Bending Moment, Pile, Excavation, Deflection.*

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FATIGUE CRACK PROPAGATION BEHAVIORS IN WELDED JOINTS X70

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ABSTRACT

Structural failure assessment approaches take into account local parameters, specimen geometry, loading and material. In the case of welded joints, in addition to these parameters, consideration must be given to the effect of the heterogeneity of properties due to welding. The objective this work is to study the fatigue crack propagation of welded joint in API X70 pipeline steel. This experimental study focused on welded joints in the different parts, unaffected base metal, weld metal and heat affected zone. The results obtained show that the fatigue crack propagation rate of cracks in the heat affected zone is delayed compared to the other zones. The effect of the microstructure and the quality of submerged arc welding of the studied X70 steel are significant. Tensile tests, hardness and measurement of energetically parameters complemented this work.

Keywords: *fatigue crack growth, mechanical behaviors, X70, specific energy.*

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IMPEDANCE SPECTROSCOPY CHARACTERISATIONS OF NBT-BT LEAD FREE CERAMICS

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ABSTRACT

The complex impedance spectroscopy technique was used to obtain the electrical parameters of (Na0.5Bi0.5)0.94Ba0.06TiO3 doped lead-free ceramics in a wide frequency range at different temperatures. These samples were prepared by a high-temperature solid-state reaction technique and their single phase formation was confirmed by the X-ray diffraction technique. The variation of imaginary part (Z") of impedance with frequency at various temperatures shows that the Z" values reach a maxima peak (Z"max) above 400Â°C. The appearance of single semicircle in the Nyquist plots (Z" vs. Z') pattern at high temperatures suggests that the electrical process occurring in the material has a relaxation process possibly due to the contribution for bulk material only. The bulk resistance of the material decreases with rise in temperatures similar to that of a semiconductor, and the Nyquist plot showed the negative temperature coefficient of resistance (NTCR) character of these materials. The frequencies, thermal effect on a.c. conductivity and activation energy have been assessed.

Keywords: *piezoceramic, impedance spectroscopy, lead free ceramics, BT, NBT, material chemistry*

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EFFECTS OF CEMENT ADDITIONS ON DURABILITY INDICATORS OF SELF-COMPACTING CONCRETE

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ABSTRACT

This paper aims to investigate the effect of five different curing regimes namely; tap water curing (W), W3, W7, W14 and hot climate (HC) on the durability indicators of self-compacting concrete (SCC). It is therefore essential to consider whether a temperature rise of making and / or ripening can cause a long-term variation in properties. In other words, one may wonder whether the hypotheses put forward on the development of the microstructure have a translation on sustainability. In the meantime, one of the major concerns for concrete is to ensure durability to all degradations from the outside environment. Indeed, the physical and chemical attacks of the environment can lead to an alteration of the durability of the material and thus lead to an alteration of its properties in the cured state. These deteriorations are generally complex phenomena involving flows of fluid through the porous matrix. In order to assess the impact of hot weather concreting on the durability properties of the SCCs, measurements of general sustainability indicators are performed. Evolutions of the properties of porosity, water absorption, and sorptivity.

Keywords: *Water Absorption, Sorptivity, Porosity*

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STUDY OF THE IONIC CONDUCTIVITY MESURED BY IMPEDANCE SPECTROSCOPY OF CE-DOPED SRTIO3 USED AS SOFC MATERIALS

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ABSTRACT

Materials with perovskite structure, especially donor doped strontium titanate has attracted considerable attention. These materials have shown some promising properties such as stability and conductivity and also relatively good performance in fuel cell tests. The conventional preparation method is solid-state reaction at temperatures more than 900°C. The obtained powders possess microstructural variations due to difficult controls over both physical and chemical characteristics. Soft chemical methods including the sol-gel route have been proposed. Such methods provide good control of the properties of the precursor and end materials, given the low calcination temperature, the fine and uniform grain sizes and the easy doping. The present work focused on the Sr1-xCexTiO3 phase (x = 0.05, 0.1), a perovskite strontium titanate doped with cerium. Emphasis was placed on the method of preparation and its impact on the electrical properties and more specifically on the ionic conductivity at high temperatures determined by impedance spectroscopy. we used two methods of preparation, the solid state route and the sol-gel route, the structural and textural properties were determined by XRD and SEM. The obtained results are interesting and clearly show the impact of the method of preparation on the various properties, in particular grain size and electrical conductivity.

Keywords: *ionic conductivity, perovskite, gel, sol, doped SrTiO3, Ce, SOFC, impedance spectroscopy*

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EFFET DE LA NATURE DES FIBRES VÉGÉTALES SUR LES PERFORMANCE MÉCANIQUES ET LA CARBONATATION DES MORTIERS

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ABSTRACT

Ces dernières années, l'utilisation des fibres végétales suscite un regain d'intérêt. En effet, ces fibres peuvent représenter une alternative aux fibres traditionnelles utilisées dans les matériaux de construction, telles que les fibres polypropylène. C'est le développement durable qui exige des matériaux respectueux de l'environnement donc des matériaux naturels. En ce sens, les fibres végétales utilisées comme renfort pour les matériaux cimentaires constituent une option très intéressante pour l'industrie de la construction. Ainsi, cet article s'intéresse aux performances mécaniques et aux propriétés de transfert des mortiers cimentaires à base de métakolin renforcés par des fibres végétales. Les fibres végétales utilisées dans ce travail (Dis, Alfa, Palmier dattier et Chanvre) ont été préalablement traitées avec de l'hydroxyde de calcium. Les propriétés étudiées comprennent la résistance à la flexion, la conductivité thermique et la carbonatation accélérée. Les résultats obtenus par ce travail montrent que les mortiers renforcés de fibres végétales présentent une meilleure capacité de déformation que le mortier témoin sans fibres. En outre, la meilleure résistance à la flexion a été enregistrée pour les mortiers de chanvre et du palmier dattier. Concernant la conductivité thermique des mortiers fibrés, elle a été réduite d'environ 15% bien que le taux des fibres introduit est relativement faible (0,1%). Cependant, ce dernier a conduit à une augmentation de la profondeur de la carbonatation. Les résultats obtenus par ce présent travail laissent penser qu'il existerait un avenir prometteur pour l'utilisation des fibres végétales dans les matériaux cimentaires.

Keywords: *Résistance à la flexion, Conductivité thermique, Fibres végétales, carbonatation accélérée.*

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USE OF THE STOCHASTIC FINITE ELEMENT METHOD FOR LINEAR ELASTICITY PROBLEMS

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ABSTRACT

The calculation of structures in civil engineering had made significant progress with numerical modeling and precisely the finite element method. The association of random aspects to this modeling is known as the stochastic finite element method, also known as the random finite element method or the probabilistic finite element method. It allows a better approach to the real behaviors of the structures. The randomness aspect in the calculation of the structures can result from different independent or associated variability's, as for example the characteristics of the materials, the geometrical data and the loading. The theme addressed in this magisterial work consists of an initiation, learning and application of the basic principles of the stochastic finite element method. We have focused on the variability of material behavior on the structural response of linear elasticity problems where the loading is mainly of static type. Problems of beams and plates are numerically treated by comparing the deterministic approach with the stochastic approach where the variability of the longitudinal deformation modulus is supposed to follow a Gaussian law with a variable standard deviation. The results found in terms of maximum displacement are compared and the contribution of the stochastic finite element method is highlighted. Several other aspects can be addressed in future work.

Keywords: *Young's modulus, stochastic finite elements, Modeling, Gaussian law, plates.*

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EFFECT OF RECYCLED CONCRETE AGGREGATE ON GEOPOLYMER CONCRETE PERFORMANCE

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ABSTRACT

Geopolymer concrete has been highly recommended as a suitable alternative to ordinary Portland cement (OPC) concrete over the past few years. Indeed, geopolymer concrete is known by its good mechanical and durability properties with a low carbon footprint in comparison to OPC concrete. However, the increasing demand of fine and coarse aggregates for concrete formulation requires a continuous supply of non-renewable raw materials, which is another real environmental issue. In this context, replacing natural aggregates by recycled concrete ones (RCA) for geopolymer concrete formulations seems to be a promising solution in order to reduce the greenhouse gas emissions of OPC industry, and preserve our natural resources. The use of RCA in OPC concrete has been largely studied, but only few investigations have been devoted to RCA based geopolymer concrete. Therefore, the present study aims to assess the effect of RCA incorporation on the properties of granulated blast furnace slag and metakaolin based geopolymer concrete. Four geopolymer concretes were manufactured with different RCA content of 0, 10, 30 and 50% by volume of the total fine and coarse natural aggregates. Density, air content and workability were measured at the fresh state. The workability evolution during the first 90 minutes after mixing was also followed. At the hardened state, compressive and splitting tensile strengths, dynamic modulus of elasticity and water porosity were investigated with a special attention to the prediction models of mechanical properties.

Keywords: *Geopolymer Concrete, Recycled Concrete Aggregate, Workability, Physical Properties, Mechanical performances.*

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THEORETICAL STUDIES OF THE PEROVSKITE MATERIALS SRTIO3 AND BATiO$_3$

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ABSTRACT

We investigate the electronic structures and optical dielectric functions of the room temperature phases of $SrTiO_3$ and $BaTiO_3$ by using Tran and Blaha's modified Becke and Johnson exchange potential. Calculated energy gaps are substantially better than previous first-principles results with respect to experimental values, further calculated optical dielectric functions as functions of photon energy are in good agreement with experimental curves, and calculated zero frequency refractive indexes are also consistent with experiment. This substantial improvement is achieved because the energy levels of the Ti d states are correctly calculated with this new exchange potential. These make a reasonable, reliable understanding of the electronic structures and optical properties of room temperature phases of $SrTiO_3$ and $BaTiO_3$. This approach should be applicable to other semiconducting materials

Keywords: *Perovskite oxide, Ab initio calculations, Optical properties*

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STUDY OF THE STURCTURAL, ELASTIC AND THERMODYNAMIC PROPERTIES OF GDX MATERIALS (X = CA) BY THE FP-LAPW METHOD

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ABSTRACT

The structural, thermodynamic elastic properties of the CsCl type of the GdCa compound were studied by performing ab-initio calculations based on the DFT implanted in the so-called WIEN2k code. The potential exchange correlation in the generalized gradient approximation (GGA) is used in our work. The calculated structural parameters, such as the network constant, the volume, compression modulus B and its derivatives B 'at static equilibrium. the formation energy and its elastic constants are presented in this study, The enthalpy of the formation and the Cauchy pressure are determined, to obtain more information on the elastic properties such as the Poisson's ratio, Young's modulus, Isotropic shear modulus are calculated in zero and different pressure ranges (0-50 GPa). We performed the thermodynamic properties of the GdCa type compound using the Debye model in the temperature range of 0 to 1000 K and the pressure effect in the range of 0 to 10 (GPa). The results obtained are compared with experimental tests and theoretical studies.

Keywords: *ab, microstructures, properties, GdCa, Materials, initio*

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FIRST-PRINCIPLES INVESTIGATION OF HALF-HEUSLER ALLOY GEKCA

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ABSTRACT

The first-principles calculations using the full potential linearized augmented plane wave (FP-LAPW) method within the generalized gradient approximation (GGA) based on density function theory (DFT) were used to study the structural, electronic, magnetic, elastic and thermodynamic properties of the half Heusler alloy GeKCa. The structural properties results reveal that our compound is stable in type 3 ferromagnetic state. The spin-polarized band structure and density of states results show a half metallic behavior for the half heusler GeKCa compound with a indirect band gap. Magnetic properties give a value of 1 Î¼B, which is in good agreement with the Slater-Pauling rule. The elastic constants demonstrate that the material studied is elastically stable and anisotropic. The thermodynamic characters are also investigated through quasi-harmonic approximation.

Keywords: *Half, Heusler alloy, FP, LAPW, Spintronic applications, Thermodynamic properties.*

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INFLUENCE DU TYPE DU VERRE BROYE SUR LES PROPRIETES PHYSICO-MECANIQUES DU CIMENT.

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ABSTRACT

Le ciment connaît aujourd'hui un regain d'intérêt important dans le domaine de la construction. Grâce à ses propriétés physiques, mécaniques et sa durabilité, sa demande excessive a poussé les cimentiers à chercher un moyen d'augmenter leurs productions. Ils sont arrivés à utiliser des ajouts minéraux qui peuvent être inertes et/ou actifs, ces ajouts permettent de garder et améliorer dans certains cas les propriétés du ciment produit. Lequel, reste conforme au contexte normatif. Cependant, l'utilisation des ajouts dans l'industrie cimentaire a un intérêt écologique qui participe dans la préservation de l'environnement et le développement durable par le recyclage et la valorisation des déchets, en diminuant les émissions de gaz à effet de serre. La Production du ciment est responsable à elle seule de 75 % de l'effet de serre qui participe au réchauffement climatique. Dans le monde, on estime à un milliard de tonnes le CO2 rejeté par l'industrie du ciment. Cette étude consiste à élaborer des ciments aux ajouts, en substituant une partie du ciment par de la poudre de verre finement broyée, trois différents verres sont utilisés dans des proportions de 10, 20 et 30 % du poids de ciment. Plusieurs analyses ont été effectuées pour observer expérimentalement leurs impacts sur les propriétés physico-mécaniques des ciments élaborés.

Keywords: *écologie., recyclage, ajout, verre, ciment*

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A GREEN SYNTHESIS OF POLY(STYRENE-CO- 1,3,5-TRIOXANE) USING AN ECOLOGIC CATALYST MONTMORILLONITE (MAGHNITE-H+)

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ABSTRACT

The copolymerization of 1,3,5-trioxane (TOX) with styrene (ST) catalyzed by efficient and environmentally friendly catalyst called Maghnite-H+ was investigated , in the presence of a natural Algerian montmorillonite clay modified H2SO4, known as Maghnite-H, as proton source, a non-toxic and an efficient catalyst for cationic polymerization of many vinylic and hetero-cyclic monomers, this ecological catalyst replaces usual toxic catalysts such as Lewis and Bronsted acids ,the oxonium ion of 1,3,5-trioxane (TOX) and styrene (ST) propagated the reaction of copolymerization, the operating conditions were opted in order to obtain a maximum yield of the linear polymer and a high average molecular mass as well. We have studied the kinetic of the reaction by the effect of the time, the temperature, the amount of Maghnite-H+ and the proportion of monomers according to the changes in yield and the intrinsic viscosity, the structure of polymers obtained was confirmed by IR analysis. 1H NMR, .

Keywords: *polymer Catalyst*

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EFFET DES CHARGES NORMALES ET DES VITESSES DE GLISSEMENT SUR LE COEFFICIENT DE FROTTEMENT POUR ALUMINIUM, ACIER ET ALLIAGE DE LAITON

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ABSTRACT

La demande industrielle pour l'amélioration de la résistance aux frottements et à l'usure de pièces, tant mécanique que de structure, est en constante croissance depuis des années. Elle se justifie notamment par la volonté de réduire les pertes considérables liées aux phénomènes de frottement. Â L'usure est un phénomène évolutif et irréversible ; chaque état d'un systÈme détruit définitivement l'état précédent, de sorte qu'il est trés difficile, voire impossible, de reconstituer le passé à partir du constat d'une dégradation. Le présent travail consiste a étudié le comportement des matériaux ferreux et non ferreux en usure et frottement sur le tribomètre; Dans le cas d'un tribomÈtre pion sur disque, le contact est qualifié d'hertzien.Il permet d'accéder au coefficient de frottement et aux paramÈtres tribométriques d'un système tribologique en fonction des conditions opérationnelles. Ces analyses sont destructives et permettent de tester des échantillons en aluminium , acier et alliage de laiton circulaires. La vitesse de frottement peut être modifiée ainsi que la charge appliquée.

Keywords: *Tribomètre, frottement, usure, perte de mass*

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STRUCTURAL, ELECTRONIC AND OPTICAL PROPERTIES OF THE DOUBLE PEROVSKITE MATERIALS BA2SCNBO6 AND BA2SCTAO6.

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ABSTRACT

This calculations are performed to investigate the electronic structure, structural phase stability, optical and vibrational properties of double perovskite oxide semiconductors namely Ba2ScMO6 (M = Nb, Ta) in the cubic symmetry using WIEN2k. In order to study the ground state properties of these compounds, the total energies are calculated as a function of reduced volumes and fitted with Brich Murnaghan equation. The estimated ground state parameters are comparable with the available experimental data. Calculations of electronic band structure on these compounds reveal that both Ba2ScNbO6 and Ba2ScTaO6 exhibit a semiconducting behavior with a direct energy gap of 2.78 and 3.15 eV, respectively. To explore the optical transitions in these compounds, the real and imaginary parts of the dielectric function, refractive index, extinction coefficient, reflectivity, optical absorption coefficient, real part of optical conductivity and the energy-loss function are calculated at ambient pressure and analyzed.

Keywords: *Optical properties., double perovskite oxide, Ab initio calculations*

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A STUDY OF THE CONTROLLED DEGRADATION OF POLYMER CONTAINING PRO-OXIDANT AGENT AND STARCH

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ABSTRACT

Most synthetic polymers are resistant to environmental degradation and their useful lives tend to be short. These facts have led to a significant increase in the volume of residual plastics in recent years. One solution to this problem consists in making these materials degradable through the addition of biodegradable additives. Polypropylene, like other polyolefins, is a non-biodegradable polymer, since micro-organisms are unable to metabolize it within an acceptable period of time. The objective of this work is focused on the study of new formulations based on polypropylene (PP), non-biodegradable synthetic polymer widely used in the packaging sector, pro-oxidant in the form of calcium stearate (CaSt) and starch, natural biodegradable polymer, to develop a new oxo-biodegradable packaging in order to reduce the volume of waste therein. In the first place, formulations were prepared in presence of CaSt and starch with different levels (0, 5, 10 and 15%) and a formulation with 2% commercial pro-oxidant whose composition is unknown. Secondly, the formulations were exposed to natural aging for 24 months in order to monitor the effect of prooxidant and starch on the photo degradation of PP, the results obtained showed that CaSt and starch did not affect the mechanical and optical properties of the PP if the content does not exceed 10% and a content of 5% CaSt was sufficient for the degradation process and gives similar results with the commercial pro-oxidant.In the third step, a soil burial test was carried out for three months to study the biodegradability of PP, the results showed a slight biodegradation of the formulations containing the pro-oxidant and the starch, the formulation with PP pure remains intact.

Keywords: *pro, starch, degradation, polymer, oxidant*

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INFLUENCE OF NA2SIO3 TO NAOH RATIO AND AL-POWDER ON PORE DISTRIBUTION OF FOAMING GEOPOLYMERS

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ABSTRACT

The use of aluminium powder as a foaming agent showed a better pore size distribution, with promising performances. The use of such as material in the synthesis of geopolymers leads to produce a suitable multi-construction material, which could be used for instance in masonry walls of the housing. Therefore, it is extremely interesting to investigate the capability of using by-products or/and industrial wastes such as waste sand treatment and aluminium-powder in the manufacturing of geopolymer products. This study aims to investigate a proposal design of foaming geopolymer, which mainly prepared from waste sand treatment and aluminium-powder. The production of the proposal foaming geopolymer mainly focused on varying the amounts of aluminium-powder in respect of sodium silicate-to-sodium hydroxide ratios of 1.7, 2 and 2.3, with a molarity of 2M. The thermal treatment at 65 Â°C was carried out for 24 hours to accelerate the curing process. The results showed that the foaming geopolymer with a sodium silicate-to-sodium hydroxide ratio of 2 and 15% of aluminium-powder revealed an optimal pore structure with highly-uniformity distributions with a density ranged between 350 and 440 kg/m3.

Keywords: *pore distribution., foaming geopolymer, powder, AL, product, Industrial by*

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COMPOSITION DEPENDENT TUNING OF ELECTRONIC AND MAGNETIC PROPERTIES IN TRANSITION METAL SUBSTITUTED ROCK-SALT MGO

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ABSTRACT

Full potential linearized augmented plane wave (FP-LAPW) method based on the density functional theory (DFT) is used to investigate the structural, electronic and magnetic properties of Fe and Ni (3dtransition metal) substituted Rock-salt wide band gap insulator Mg1-xMxO(M = Fe, Ni). We have performed spin polarized calculations throughout this work with generalized gradient approximation (GGA) type exchange correlation functional.Additionally, the electronic structures and density of states are computed using modified Becke-Johnson (mBJ) potential based approximation with the inclusion of coulomb energy (U = 7 eV). Based on the Vegard's law and structural optimization, the lattice parameter and bulk modulus are found to be in good agreement with experimental values. Moreover, the analysis of electronic band structures reveals an insulating character for Ni substituted MgO while semiconducting and half-metallic character for Fe substituted case. It has been found that the p-d super-exchange interaction provides a ferromagnetic character due to the 3dtransition metal impurities and oxygen atom. The observed p-d hybridization at the top of the valence band edge in this investigations could be useful for magneto-optic and spintronic applications..

Keywords: *FP ; LAPWmBJ + UP ; d exchange interactionHalf ; metallicMagnetic moment*

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EFFET DU TRAITEMENT THERMIQUE SUR LA CERAMIQUE CELLULAIRE CIMENTAIRE

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ABSTRACT

Les céramiques cellulaires occupent plusieurs domaines à savoir l'isolation thermique, filtration, isolation acoustique, construction...etc. A cet intérêt on a pensé d'élaborer une céramique poreuse à partir de la matière première locale (kaolin), destinée à la construction isolante thermiquement. Pour ce faire il est recommandé, sur le plan technicoéconomique, de choisir une meilleure méthode de préparation. Dans notre cas on a opté pour la méthode de moussage à température ambiante suivit par un séchage puis un frittage à différentes températures. Le traitement thermique qu'on a utilisé, qui est le frittage a plusieurs températures 1100, 1150, 1250 ˚c pour un palier de 2 h, a donné à partir de l'analyse ATD les réactions subis par les échantillons à savoir deux réaction endothermique à 480.8 et 677.8 ˚c succédées par une perte de masse équivalant à 6%, plus une réaction exothermique vers 1101,4˚c. les spécimens obtenus présentent une porosité et densité variable en fonction de la température du traitement (65, 55.93 et 39 %) (0.69, 0.82 et 1.17 g/cm3) correspond respectivement à (1100, 1150, 1250 ˚c), vue les valeurs de porosité (39%) la céramique obtenue dépasse les norme de classement des céramiques poreux, c'est-à-dire elle n'est pas une céramique cellulaire mais plutôt dense. Donc il faut trouver un moyen qui garantit les transformations de phases voulues sans qu'il y est répercussion sur la porosité.

Keywords: *Densité., Porosité, hydratation ciment, kaolin, Céramique cellulaire*

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EFFECT OF ACIDS AND SULPHATES ON THE DURABILITY OF SELF-COMPACTING CONCRETES

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ABSTRACT

The deterioration of self-compacting concretes (SCC) in acid and sulphate media is a major problem in the evaluation of structural durability. The aim of our work is to study this effect and to do this, a test protocol was used to evaluate the effect of sulphate and acidic media on the mechanical properties and microstructure of SCCs. Two types of cement were used CEMIII-A-42.5 cement (60% slag) and cement CEMI-52.5 and three water / binder ratios (E / L = 0.32-0.38-0.44). The SCC specimens were stored in all three media, water (control), 5% H2SO4 and 5% Na2SO4. The measured properties were: The compressive strength of cubic test pieces at 30, 90 and 180 days and X-ray diffraction (XRD) analysis. These results show that high furnace slag improves the durability of SCCs.

Keywords: *sodium sulfate, sulfuric acid, Durability, SCC*

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INVESTIGATION OF TOTAL AND PARTIAL MAGNETIC MOMENTS OF MN2NIAL WITH PRESSURE AT A SEVERAL TEMPERATURES

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ABSTRACT

The first principles calculations of structural and magnetic properties of the Heusler material Mn2NiAl, have been studied using a full potential linearized augmented plane wave (FP-LAPW) within the density functional theory (DFT). The phase stability of the cubic austenitic (L21) structure for Mn2NiAl in both Cu2MnAl (Fm43 m space group) and Hg2CuTi (F43 m space group) type of structures with ferromagnetic and antiferromagnetic states, has been treated by applying the generalized gradient approximation proposed by Wu and Cohen (WC-GGA) alongside with the martensitic structure of Mn2NiAl. The analysis of phase stability, cohesive energy and the calculated formation enthalpy of Mn2NiAl reveal that the ferromagnetic MnMnNiAl is the most stable type of structure. Moreover, the calculated lattice parameters are found to be in good agreement with theoretical data. The variation of total magnetic moments MT(Î¼B), MMn (Î¼B), MNi (Î¼B) and MAl (Î¼B) in Mn2NiAl with pressure at varying temperature (0, 273 and 344 K), have been calculated.

Keywords: *Mn2NiAl, DFT, formation enthalpy, cohesive energy, magnetic moments*

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ASSESSMENT OF DURABILITY OF FIBER-REINFORCED MORTAR IN AGGRESSIVE ENVIRONMENTS

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ABSTRACT

The high compressive strength, good fire resistance, thermal and sound insulation, flexibility employment and the abundance of raw materials make concrete the most used material in all areas of construction. Despite these advantages, the concrete is a material which is characterized by a low resistance to traction, a poor resistance to the shock and cracking; harmful properties that affect the durability and safety of structures. In an attempt to remedy these harmful aspects, several methods have been used such as reinforced concrete, prestressed concrete ... etc. Today, the fiber reinforced concrete is a very ingenious process. The objective of this study is to define the behavior of fiber-reinforced mortar in aggressive environment. The work involves the preparation of several series of specimens using three types of fibers: polypropylene, polyethylene and metallic, with a ratio W/C = 0.49. The mortar samples have dimensions as 4x4x16mm is immersed in two strong acids: hydrochloric acid (HCl) and sulfuric acid (H2SO4). Other samples have undergone treatment in a weak acid: acetic acid (CH3COOH). Tests of mass loss, the compressive strength to 7, 14 and 28 days are made. The results showed that the fiber-reinforced mortar, preserved in acidic environment, have a resistance drop to compression relative to the mortar without fibers. A clear improvement of the compressive strength is observed for the same samples even in the presence of aggressive agents.

Keywords: *Mortars; durability ; polypropylene fibers ; metallic fibers ; polyethylene fibers*

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THE STRUCTURAL,ELECTRONIC AND MECHANICAL PROPERTIES OF HALF HEUSLER XNISN(X=HF,ZR) COMPOUNDS.

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ABSTRACT

In the present work, we studied the structural, electronic and elastic properties of the Heusler compound HfNiSn and HfNiSn For this purpose, we performed ab-initio calculations using first principle method based on (DFT), by using the full potential linearized augmented plane wave (FP-LAPW), implemented in the Wien2k code. In order to determine these properties, we used the approximation of the generalized gradient (GGA) for the term of the exchange and correlation potential (XC). The values of the equilibrium parameter are in agreement with the available experimental results. The mechanical properties, such as shear modulus, Young's modulus, elastic constants, Poisson's ratio, and shear anisotropy factor, have been investigated. The elastic properties reveal that this compound is mechanically and dynamically stable. Its ductile behavior, and the shear anisotropic factor reveals the isotropic nature of both of materials. The band structure predicts this compound to be a semiconductor with indirect band gap 0.39 eV and 0.43eV of HfNiSn, HfNiSn respectively.

Keywords: *FP, structural properties, Keywords: half Heusler, LAPW, Wien2k*

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STABILIZATION / SOLIDIFICATION METAL ELEMENTS FROM LANDFILL SLUDGE WITH BRICK WASTE

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ABSTRACT

The objective of this work is to use the stabilization / solidification technique on the landfill Sludge, this Sludge is heavily polluted by heavy metals, and it must be properly treated before discharge into the environment. The process consists of a stabilization / solidification treatment using a hydraulic binder in order to limit the solubility and mobility of the pollutants. In addition, the possible use of brick waste as a partial replacement of standardized sand used for S/S process was investigated. Concrete mixtures were prepared using portland cement, brick,standardized sand , and distilled water. In this study we tested the effect of sand substitution by brick on mechanical resistance and the retention of pollutants. we substituted the fraction 1.6 of normalized sand and the replacement ratios tested are 25.50 and 100%. Hardened concrete specimens were subject to compressive test as well as flexural strength test at 7 and 28 days. Besides, a leaching tests was performed, and the collected eluates were analyzed for pH, total dissolved solids, chemical oxygen demand, chlorides, sulfates, phosphorus, and heavy metals. The characterization of sludge shows that the latter is loaded with heavy metals including lead, iron, hence the need for S / S treatment of this waste. It appears from this study that the formulations F1P and F2P to give satisfactory results from the point of view of mechanical strength, and from the point of view of retention of metals. Â

Keywords: *brick, hydraulic binder, TCLP test, solidification/stabilization, Landfill, Sludge, leaching tests.*

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PREPARATION AND PHYSICOCHEMICAL CHARACTERIZATION OF PECTIN DERIVATIVES OBTAINED BY CHEMICAL MODIFICATIONS

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ABSTRACT

This work is devoted to the chemical modification of highly methylated lemon pectin by amidation methods by operating in the heterogeneous medium.The amidation of pectin was achieved by introducing the primary amines which is n-dodecylamine. The amidation of the pectin was carried out under the influence of the mass ratio pectin / amine (1/2) for 3 days. The pectin derivatives obtained were subjected to the various physicochemical tests (characterization by FTIR, determination of degree of esterification, emulsion effetion, etc...).The result obtained from the surface tension showed that the amidated pectin has surfactant properties with a minimum surface tension, recorded for pectin amidated in a heterogeneous medium by n-dodecylamine, of the order of 30.9 dyn / cm. Thus, the use of these amidated pectins in the formulation of oil-in-water emulsions has made it possible to obtain considerable emulsification properties and stabilities.

Keywords: *surface tension, characterization, amidation, Pectin, emulsifying properties*

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ÉTUDE EXPÉRIMENTALE ET SIMULATION NUMÉRIQUE DE L'AFFAISSEMENT DES BÉTONS A BASE DE DIFFÉRENTS SABLES ET D'AJOUTS MINÉRAUX

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ABSTRACT

La consommation des granulats qui constituent le squelette des bétons hydrauliques, c'est accentuer ces derniers temps vu l'évolution dans le domaine du génie civil. Parmi ces granulats «les sables» qui sont considérés comme étant le constituant du squelette granulaire qui a le plus d'impact sur les qualités du béton et du mortier, car il influence à la fois les propriétés du béton à l'état frais (rhéologie) et les propriétés à l'état durci (résistance mécanique et durabilité).L'objectif de ce travail est d'évaluer expérimentalement et numériquement avec le logiciel Béton Lab Pro3, l'affaissement et les résistances à la compression des bétons à base de sable de carrière.Des modifications viendront s'ajouter aux sables de carrières pour une correction des courbes granulométriques par la substitution avec 20 % de sable d'oued ou 10% de sable de dune ainsi que l'incorporation d'un taux 15% d'addition minérale (Pouzzolane , laitier), avec un rapport fixe E/C = 0.6 . L'analyse des résultats nous a permis d'aboutir au fait que le comportement des bétons à l'état frais et à l'état durci varie expérimentalement en fonction des types de sables et en fonction du mélange adopté , mais cela n'était pas le cas numériquement avec les formulations issues du logiciel Béton Lab Pro 3.

Keywords: *ajouts minéraux, sable de dune, sable d'oued, affaissement, Béton Lab Pro3*

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THERMAL CONDUCTIVITY OF RAW AND STABILIZED SOIL USED FOR UNFIRED BRICK

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ABSTRACT

Using compressed earth bricks (CEB) as an alternative construction material is a very promising technique in order to lower costs for building area. However, earth constructions suffer from a lack of data concerning thermal behavior and thermal properties. These properties such as thermal conductivity are influenced by different manufacturing parameters such as bulk density, water content, chemical stabilization and cure period. This paper presents an experimental investigation performed on raw and lime stabilized cylindrical samples using local soil (Wl= 37, Ip= 17). Samples were stabilized with lime contents of 4% and were compacted using a double piston mold. Measured data leads to determine on one hand, the influence of different drying periods on the thermal conductivity for the studied soil and on the other hand the influence of porosity. Results show that thermal conductivity is highly influenced by the porosity and the bulk density. However, the measured values of the thermal conductivity of stabilized samples are lower compared to the raw material samples.

Keywords: *Stabilization, Thermal conductivity, Compressed earth bricks, Porosity*

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SYNTHESIS, CHARACTERIZATION AND SPECTROSCOPIC OF COPPER (II) - PARACETAMOL AND SPIRAMYCIN. EVALUATED OF CATALYTICAL, ANTIBACTERIAL AND TOXICITY ACTIVITIES OF COMPLEX-BASED DRUG.

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ABSTRACT

The study on complexation of drug molecules with various metal ions is an important field of research in the chemical, biochemical, medicinal and pharmacological point of views [1]. The complexation offers the metal ion a multitude of coordination possibilities and a wide range of geometries. In this work we are interested in synthesizing complexes of copper(II) - paracetamol and spiramycin based drug. The complexes are synthesized by reflux process as powder compound from a water-ethanol mixture (50% in volume). The [Ligand]/ [Metal] ratio is fixed to 2:1. They were characterized by some spectral and physico-chemical techniques like elemental analysis (C, N, S and M), IR spectroscopy, nuclear magnetic resonance (1H NMR, 13C NMR), TGA and UV-visible spectroscopy. On the basis of all the data, the structures describing the different chelates have been proposed. The biological activity of the free ligands (paracetamol and spiramycin) and their Cu complexes were tested in DMSO, in vitro, against bacterial and fungal organisms by modeled well diffusion method. Furthermore, the toxicity of the synthesized complexes has been evaluated.

Keywords: *Antibacterial and Toxicity Activities., Complexes, Spiramycin, Paracetamol, Copper*

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IDENTIFICATION ET CARACTÉRISATION DES MATÉRIAUX DE CONSTRUCTION DE LA WILAYA D'ADRAR

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ABSTRACT

En Algérie plus de 80% du territoire national est occupé par le Sahara. A Adrar, la recherche universitaire se penche sur la particularité du climat et de l'environnement de ces zones dites arides. Cette recherche porte souvent sur des problématiques liées à l'avenir des constructions, des ouvrages et des infrastructures en zones arides. Ceci permettra surement de répondre aux impératifs de durabilité des bâtis anciens et nouvelles dans ces zones et en particulier dans la région d'Adrar. La sauvegarde du patrimoine et de l'environnement passe obligatoirement par la valorisation des matériaux locaux en l'occurrence le sable des dunes et les gisements d'argile qui sont disponibles en quantités inépuisables, ce qui permet de répondre à la fois, à la réhabilitation des anciens bâtis (ksours) et au besoin accru des matériaux de construction pour répondre a la demande croissante. La région d'Adrar est connue pour ses anciennes constructions se présentant sous forme de ksours et de casbahs fortifiées, de forme architecturale vernaculaire. Les fissurations dans les constructions, les déformations, les tassements et les effondrements progressifs des constructions ksouriennes à forte valeur patrimoniale, sont autant de signes de dégradations dans cette région. Cet état de fait est en grande partie peut être dû à la mauvaise préparation et ou confection et par conséquent la mauvaise durabilité des matériaux utilisés. L'objectif de ce travail est la caractérisation et l'identification physique, mécanique et chimique des matériaux locaux à base de terre (argile et sable des dunes) comme matrice, et ce pour la confection des briques de terre stabilisés (BTS) ou comprimés (BTC) a des caractéristiques physiques, mécaniques et durabilité meilleures par rapport aux briques d'adobes anciennement utilisés pour pouvoir les intégrer dans la réhabilitation et la protection du patrimoine architectural des milieux arides et hyperarides spécialement dans la wilaya d'Adrar.

Keywords: *argile, caractérisation, identification, sable des dunes.*

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INFLUENCE OF MINERAL ADDITIONS AND FIBER CONTENTS ON THE MECHANICAL PERFORMANCE OF ULTRA HIGH PERFORMANCE FIBERED CONCRETES

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ABSTRACT

In order to improve the mechanical performances of the UHPFC as well as to see the effect of the mineral additions and the effect of the fiber content on the mechanical performances of the UHPFC, we proceeded to their manufacture starting from local raw materials such as: CEM I 52.5, sand of dune finely ground, pozzolan, metal fibers at different percentages and Superplasticizer Sika. The results obtained show that the mechanical strengths are greater than 34 MPa in flexion and 135 MPa in compression for a fiber percentage of 5% after 28 days, those regardless of the added mineral; Sand of dunes or Pozzolana.

Keywords: *metal fibers, Mineral additions, Mechanical resistances, UHPFC, Raw materials.*

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INFLUENCE OF THE ADDITION OF POLYESTER FIBERS ON THE THICKNESS OF A SEMI-GRANULAR BITUMINOUS CONCRETE

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ABSTRACT

This paper present a part of research conducted to investigate the influence of the incorporation of polyester fibers on the thickness of a 0/14 semi-granular bituminous concrete intended for the wearing course of a flexible pavement. The polyester fibers used in this study provide from recycled plastic bottles as raw materials. Laboratory tests were conducted to evaluate the effect of two factors which are the percentage and length of polyester fibers on the thickness of the bituminous concrete. The tests undertaken comprise the Marshall test. In order to study the effect of polyester fibers on the thickness of bituminous concrete, we took the thickness of Marshall Specimens as illustrative model. In this study, the optimum bitumen content was determined as 5,49 %, we used three different lengths of fibers (L1=8mm, L2=16 mm and L3=32mm) with three different contents of fibers (0,3 %, 0,5 % and 0,7 %) by weight of aggregate. Bituminous concrete specimens with polyester fibers were manufactured at the optimum bitumen content. The results indicate that, modified mixes have higher thicknesses than the control mixes. The maximum increases of the thicknesses were: 4,52 % at 0,5 % of fiber content (L1=8mm), 4,36 % at 0,5 % of fiber (L2=16mm) and 5,49 % at 0,7 % of fiber (L3=32 mm) compared to the control mix. The results showed that fiber length has little effect on the thickness of bituminous concrete compared to the fiber content. In addition, the increase of this thickness values due to the absorption of bitumen to the fibers existing in the mixture. Therefore, it is concluded that the application of this fiber in bituminous concrete does not improve the compacting operation.

Keywords: *Marshall test, wearing course, polyester fibers, Bituminous Concrete, flexible pavement*

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EFFECT OF COLUMN CROSS-SECTION REDUCTION ON SEISMIC PERFORMANCE OF REINFORCED CONCRETE BUILDING

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ABSTRACT

The columns are generally vertical and rectilinear elements intended to withstand axial compressive loads. They are used to support floors, roofs, overhead cranes ... etc, they allow to transmit the gravitational actions (self-weight, permanent loads, snow load, ...) to the foundation. The objective of this study is the search for a better design of a structure braced by sails, which makes it possible to optimize the columns from a point of view of forms, and their arrangement in the structures. This makes it possible to select the best seismic performance of the structure according to several variants. In addition, a study is envisaged to test, the effect of the reduction of the cross section of the columns on each floor as a function of the height of the floor, the elevation sails at different heights, the cost of construction and the choice of the foundation type, to make the structure complies with the conditions of Algerian seismic regulation RPA99 / V2003 and at each step, the dynamic performance is calculated by the software (ETABS V16).

Keywords: *RPA 99/V2003, ETABS v9.7.0, Earthquake, Concrete, Building, Sailing.*

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STUDY OF THE COMBINED EFFECT NATURAL POZZOLAN-SUPERPLASTICIZER ON THE RHEOLOGICAL PROPERTIES OF MORTARS BASED ON CRUSHING SAND.

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ABSTRACT

This work focuses on the exploitation of local industrial waste and its use in the formulation of concrete and mortars. The objective of this study is the analysis of the combined effect superplasticizer-mineral additions (natural pozzolan) on the rheological properties of mortars based on crushing sand. The cement was substituted by a mineral addition (AM), (natural pozzolan) (NP), at contents ranging from 0 to 30%. To control the workability of the mortar, two types of superplasticizer were used; the first based on melamine resin (PMS) and the second based on polycarboxylate (PC). The results obtained show that the combined effect (NP-superplasticizer) has a great effect on the rheological properties of mortar based on crushing sand. Its presence decreases the parameters rheological, reduces the water absorption coefficient and increases the loss in weight.

Keywords: *natural pozzolan, mortar, crushing sand, Cement, rheology, workability.*

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AB-INITIO STUDY OF SOLID SOLUTION (FE, CO) 2B OF TRANSITION METAL SEMI-BORIDE.

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ABSTRACT

There is relatively little research on transition metal alloy borides (Fe1- xCox) 2B (x=0, 0.25, 0.5 , 0.75, 1) . Fe2B and Co2B have the same tetragonal structure (space group I 4 / mcm, No. 140), and The aim of this paper is to see the effect of the addition of Cobalt (Iron) atoms on the total density of states (total magnetic moment) and partial density of states (PDOS) of the solid solution (Fe1- xCox) 2B. We have carried out the plane-wave pseudopotential approach,within the framework of the first-principles density functional theory (DFT) implemented within the CASTEP code (Cambridge Serial Total Energy Package), in addition the all-electron method (FP-LAPW) was used .In our work we have used GGA (generalized gradient approximation), with the PBE exchange-correlation function . The calculated magnetic moment show a good agreement with the experimental results, and the total density of states of the compounds (depending on the concentration taken) follows the total density of the metal elements (Fe, Co) which constitutes it according to their percentages in the material, that means, the magnetic moment decrease more in the field of low concentrations of cobalt atoms. On the other hand we have used the virtual-crystal approximation (VCA) to calculate; lattice parameters, elastic constants, in the frame of anisotropic elasticity the polycrystalline Young and bulk moduli are computed and plotted in the three dimensional (3D) surfaces and planar contours of of (Fe1- xCox) 2B compounds at several crystallographic planes, ((100) and (001)) to reveal their elastic anisotropy.

Keywords: *Magnetic moment, Virtual crystal approximation (VCA), DFT, Solid solution, Anisotropic elastic*

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MECHANICAL PROPERTIES OF POLYSTYRENE MATRIX REINFORCED WITH NATURAL ALFA FIBERS: CHEMICAL TREATMENT

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ABSTRACT

This study investigated the effects of chemical treatment of fiber Alfa on the mechanical behaviour of polystyrene/plant fiber composites. The Alfa fibers are used as reinforcement after being treated by aqueous NaOH (caustic soda) at 1% and 5% for 24 and 48 hours at 25Â°C. It is found that the stiffness (Young's modulus) and the tensile strength properties of composites with treated fibers were significantly improved compared to those elaborated without fiber treatments. However, these mechanical properties decline in the case of composites with fibers treated for 48 hours by aqueous caustic soda at 5% concentration. This decrease is attributed to the alteration of the fibers under chemical treatment time prolongation effect.

Keywords: *polystyrene, Alfa natural fibers, chemical treatment, material stiffness and strength*

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NEODYMIUM COORDINATION POLYMER WITH 1-H-BENZIMIDAZOLE-5-CARBOXYLIC ACID

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ABSTRACT

Ces dernières années, la conception et l'assemblage rationnels (PC) ont suscité un vif intérêt, principalement motivés par leurs diverses compositions chimiques et architecturales, ainsi que par leurs applications fascinantes tant que fonctionnels tels que la catalyseur, la détection, la séparation, la luminescence, etc. Les CP ont une base de lanthanides particulièrement attrayante, ils ont une direction différente, leurs géométries de coordination souple, leurs géométries de lumière et magnétiques fascinantes. La construction du processus de PC est fortement influencée par de nombreux facteurs, tels que le solvant, la valeur du pH et la température de réaction. D'autre part, les propriétés of ligands. Nous rapportons ici la synthèse hydrothermale et la caractérisation du nouveau polymère de coordination: Poly [aqua-μ3-1H-benzimidazole-5-carboxylato di-μ2-1H-benzimidazole-5-carboxylato-néodyme (III)]. The diffraction from X on a cristalled the monocristal group is the group of space group triclinique P-1. L'unité d'asymétrie comprend un ion Nd III, trois molécules d'Hbic-anions et une molécule d'eau coordonnée.

Keywords: *X, Lanthanides, Coordination polymer, ray diffraction*

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STATISTICAL MODELS TO PREDICT THE MECHANICAL BEHAVIOR OF ROLLER COMPACTED CONCRETE PAVEMENT (RCCP) UNDER HOT CLIMATE

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ABSTRACT

The ease and speed of implementation of the RCCP as well as the low price compared to asphalt concrete, in addition to the widespread spread of cement plants and the abundance of construction materials and their distribution around the world, made the idea of using this material in arid and semi-arid areas, logical and easy to embody. But given the specificity of the climate in these areas, where it is classified as a hot climate characterized by high temperature and low humidity, prompted us to study the effect of this climate on this kind of concrete. This study presents the results from an experimental investigation of the behavior of roller compacted concrete pavement (RCCP) when cured under different environmental conditions, a factorial design was carried out to model mathematically the influence of three parameters on mechanical behavior of RCCP, Compressive strength, and splitting tensile strength that are important for the successful development of RCCP. The parameters considered in this study were temperature, humidity and age of RCCP. The responses of the derived statistical models are compressive strength, and splitting tensile strength. sixty-four e mixes were prepared to derive the statistical models, and Sixteen were used for the verification and the accuracy of the developed models. The models established using a statistical design approach provide an effective means to evaluate the influence of climate Data on the RCCP and reveal the order of influence of each parameter on the modeled responses. the derived statistical models can simplify the test protocol required to optimize RCCP behavior in arid zones, This is due to the use of the models in realization to predict the mechanical response of the RCCP in different climatic conditions.

Keywords: *RCCP, hot climate, mechanical behavior, Modeling, factorial experimental plans*

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SYNTHESIS AND CARACTERISATION OF COMPOSITE MATERIALS BASED ON SMICTITE AND NICKEL

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ABSTRACT

Clay is a raw material used since ancient times. Its natural abundance and immediate availability explain their great uses over time.Nowadays the use of clays, especially those rich in SiO2 and Al2O3, is experiencing a new flight in: construction, industrial and artisanal ceramics and in the pharmaceutical industry.The interest given in recent years to the study of clay by many laboratories in the world is justified by the importance of the surfaces they develop, the presence of electrical charges on this surface and especially the exchangeability of interlayer cations.The most cited and recent work concerns the intercalation of these materials with cation exchange. It consists of an insertion of chemical species between the layers of clay, which increase its interlayer space this result in the displacement of the interlayer distances observed by the X-ray diffraction.The objective of our work is to modify the smectite clay by a cationic exchange with nickel for use as a catalyst in the catalytic hydrogenation of acetophenone by metal systems. In addition, the same clay has been modified by intercalation with xylose to obtain an organophilic material.The first preliminary catalytic tests of the hydrogenation of acetophenone by metal systems using the clay exchanged as catalyst are very conclusive and interesting.Indeed, the reaction leads to a hydrogenation product in this case phenethyl alcohol and clearly demonstrates the catalytic properties of our material.

Keywords: *Heterogeneous Catalysis, Intercalation, Nickel, Smectite, Composite materials, Cation Exchange*

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EFFET DE L'ADDITION DU MAGNÉSIUM ET DU VIEILLISSEMENT NATUREL SUR LES PROPRIÉTÉS MICROSTRUCTURALES DES ALLIAGES B206

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ABSTRACT

Les effets de l'addition du magnésium et du vieillissement naturel sur le comportement microstructural des alliages Al-Cu de type B206 ont été étudiés. Les observations microscopiques (MEB, EDS et microscopie optique) ont révélées la formation de plusieurs phases telles que β-Fe, α-Fe, Mg2Si etc. dans les alliages tels que coulé. Ces phases, sous forme de composés métalliques, se logent pratiquement le long des joints des grains. Il a été remarqué que la fraction volumique des particules Mg2Si croit avec l'augmentation du Mg. Le traitement thermique d'homogénéisation-trempe-vieillissement naturel conduit simultanément à la dissolution des particules Mg2Si se trouvant sur les joints de grains et à la formation de celles-ci à l'intérieur de la matrice.

Keywords: *magnésium, traitement thermique, Alliages B206, composés intermétalliques.*

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ÉTUDE DE L'INFLUENCE DE DIFFERENTS TYPES DE SABLE SUR LES PROPRIETES RHEOLOGIQUES DES BAP

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ABSTRACT

Cette étude consiste à étudier l'influence de différents types de sable sur les propriétés rhéologiques et celles de la stabilité statique des bétons autoplaçants (BAP). Une modélisation statistique basée sur l'utilisation de la méthode des plans d'expériences a été utilisée pour mettre en évidence les effets du sable de rivière (RS), du sable concassé (CS) et du sable de dune (DS) en combinaisons binaires et ternaires sur l'ouvrabilité, la capacité de passage et la résistance à la ségrégation des BAP. Les modèles mathématiques obtenus sont très utiles pour mieux connaître les effets de toutes les combinaisons possibles de RS, CS et DS en utilisant les plans de mélange (diagrammes ternaires) afin d'optimiser les combinaisons de sables appropriées pour obtenir un bon BAP. Les résultats indiquent que pour une combinaison de sables donnée, les limites préconisées par EFNARC peuvent être atteintes (écoulement de 65 à 79 cm, le temps d'écoulement T50 entre 2 et 5 secondes et le temps d'écoulement au V-Funnel supérieur à 6 secondes), malgré les effets négatifs de proportions élevées de DS et de CS sur la capacité de passage exprimée par l'essai L-box (H2/H1 inférieur à 0,8). Cependant, une attention devrait être portée sur la capacité de passage et la stabilité statique, qui sont considérablement affectées par les proportions élevées de DS et CS (Pi supérieure à 15 % et Pd de l'ordre de 10 mm).

Keywords: *BAP, Types de sable, Propriétés rhéologiques, stabilité statique*

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THE BOND PERFORMANCE OF NEAR-SURFACE-MOUNTED(NSM) REINFORCEMENT

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ABSTRACT

The objective of the experimental program developed in this work is to study the possibility of using high-strength hard steel bars as reinforcement to strengthening concrete structural members using the NSM (Near Surface Mounted) technique with different surface configuration and groove dimensions, to characterize the bond behaviour between the reinforcement and the concrete. To achive this objectives, we carried out a direct pull-out tests on concrete blocks (350 Ã— 300 Ã— 150 mm). in order to improve the adhesion quality between the hard steel bars and the concrete, Different types of surface treatment were applied to the smooth rods in order to enhance the bond with concrete, the hard steel bars were studded with two types of sand of different grain sizes, the sand was fixed on the hard steel bars with a thin layer of epoxy resin. According to the NSM technique, the use of hard steel as reinforcements in concrete is valid. The reinforcements have good bond properties with concrete.

Keywords: *hard steel, NSM, bond, resin, concrete.*

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INFLUENCE DES DIMENSIONS DES FIBRES NATURELLES SUR LES CARACTÉRISTIQUES MÉCANIQUES DES COMPOSITES A MATRICE ARGILEUS

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ABSTRACT

L'utilisation des fibres naturelles dans des matrices argileuses est une technique de renforcement utilisée depuis des siècles dans les constructions. Les fibres naturelles incorporées dans des matrices cimentaires nécessitent divers traitements spécifiques pour pallier au problème d'incompatibilité entre les fibres naturelles et la pâte de ciment, à cause des sucres renfermés dans la plante. Nous avons pour cet effet, procédé à l'utilisation de ces fibres dans des matrices argileuses pour étudier l'effet l'incompatibilité fibres-matrices. Les essais de flexion trois points et de compression avec mesure des déformations ont montré que les composites ont un comportement très ductile, dû à la présence des fibres qui jouent réellement le rôle de renfort pour le composite, alors que la pâte d'argile ne présente de faibles résistance et un comportement fragile. Les dimensions des fibres ont une grande influence sur le comportement mécanique des composites à matrice argileuse, et on a trouvé que les fibres donnent les meilleures résistances à la flexion entre 4 et 6 cm, et que la compression augmente de façon considérable sans endommagement à des contraintes qui avoisinent les 18 MPa, ceci est du à la grande capacité des fibres de reprendre les efforts latéraux de traction dans les composites.

Keywords: *Fibres végétales, Matériaux, Eco, Composites, Résistances*

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ETUDE EXPÉRIMENTAL DU COMPORTEMENT MÉCANIQUE DES BRIQUES DE TERRE COMPRESSÉES STABILISÉ

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ABSTRACT

Suite à un intérêt grandissant à diminuer la consommation d'énergie et l'impact environnemental du secteur de bâtiment, un retour à la construction en terre en Algérie est largement souhaité. La brique de terre compressée stabilisée BTCs est une technique de construction en terre obtenue par une compression statique ou dynamique du sol . Ces matériaux traités ou non sont les premiers matériaux terre normalisés face à une progression constante de leurs utilisations. Depuis sa fabrication en passant par son exploitation jusqu'à sa destruction la construction en brique de terre comprimée est respectueuse au critère du développement durable . La terre crue tel qu'elle est souvent ne présente pas de bonnes propriétés surtout en présence d'eau, pour cela des traitements sont utilisés pour améliorer les caractéristiques de brique selon trois mode de stabilisation mécanique, physique et chimique. L'objectif de ce travail, est d'étudier le comportement mécanique des BTCs en utilisant un sol provenant d'un gisement de la région de Béni-Saf. Différents traitements ont été utilisés avec différents teneurs 6% ET 8% : une pouzzolane provenant de la même région (Béni-Saf), la Fumé de Silice qui est un produit commercialisé. Dans le but d'améliorer la résistance mécanique, ces additifs ont été mélangés à différents rapports massiques du sol sec. La comparaison des résultats entre les matériaux traités et non traités montre que la stabilisation avec des additions minérales comme la pouzzolane et la Fumé de silice améliore les propriétés mécaniques des brisques.

Keywords: *résistance à la compression., brique de terre compressée stabilisé BTCs, Développement Durable*

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INTERACTION SIMULATION OF AN ENERGY ION BEAM WITH MASSIVE IRON

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ABSTRACT

The present work consists in the simulation of interaction of a beam of Kr+ ions with a solid iron target by the SRIM (Stopping and Range of Ions In Matter) software. The purpose is to determine different parameters related to sputtering and implantation of ions in the target, such as the distribution of ions, electron and nuclear energy loss distributions as a function of the penetration depth, and sputtering yield as well as the damage created inside the target. Particularly, we are interested in the sputtering phenomenon. For good conditions of simulation, we consider 10000 Kr+ incident ions of energy of 5 keV, in a first step and 1 keV in a second step, with a variable angle of incidence. The results obtained show a quasi-exponential evolution of the sputtering yield with the angle of incidence up to 73 Â° and then a decrease for grazing incidence.In addition, we have evaluated the sputtering yield as a function of incident energy. The results obtained show that the sputtering threshold is about a few tens of eV and the evolution is very fast at low energiesÂ

Keywords: *ionic sputtering, iron, SRIM 2013 software, interactions*

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L'EFFET D'AJOUT DE POUDRE ET DE SABLE DE VERRE SUR LE COMPORTEMENT D'UN BETON

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ABSTRACT

Le problème environnemental posé par les déchets non biodégradables tels que les bouteilles en verre non réutilisables devient une préoccupation majeure compte tenu des quantités énormes produites dans les grandes villes. En plus de l'utilisation du ciment et des granulats provenant des carrières et sablières pour l'élaboration des bétons ne cesse d'augmenter et leur procédé de fabrication est néfaste pour l'environnement notamment la fabrication du ciment qui engendre des émissions atmosphériques importantes de particules ayant un impact environnemental conséquent sur l'homme et sur la nature. L'étude entreprise constitue une contribution à la caractérisation expérimentale du comportement mécanique d'un béton de verre pilé. L'effet sur le comportement mécanique de ces bétons, à base des ajouts tel que la poudre de verre et le sable de verre, en substitution du ciment et de sable par plusieurs fractions massiques (0%, 5%, 10%, 15%) est mis en évidence. Pour cela nous avons procédé à une analyse expérimentale basée sur le recyclage du verre sous forme de poudre et de graviers sable pour la réalisation des différents spécimens. Les résultats obtenus lors des essais mécaniques mettent en évidence l'effet de ces ajouts sur les propriétés mécaniques du béton. En effet, En comparant les résistances des bétons à base de déchets de verre, on constate que les bétons B15P0S etB15P5S ont les mêmes résistances et pour le béton B15P15S, on remarque une légère diminution de la résistance. En comparant les résistances des bétons à base de déchets de verre par rapport au béton témoin, on constate une diminution de la résistance qui varie entre 12% et 18%. Cet effet pourrait contribuer à la croissance du comportement mécanique pour certaines proportions et à la décroissance pour d'autres variantes d'étude.

Keywords: *essais mécaniques, substitution partielle, bétons de recyclage, Déchets de verre, analyses*

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ETUDE COMARATIVE DE L'EFFET DES AJOUTS DE CIMENT NATUREL ET METAKAOLIN SUR LES CARACTERISTIQUES DES MORTIER DE CHAUX

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ABSTRACT

Les mortiers de restauration doivent avoir une composition similaire aux matériaux de l'ancien bati. Pour assurer cette compatibilité, des liants de chaux aérienne peuvent être utilisés avec l'ajout de ciment naturel et de métakaolin. Le but de ce travail est de formuler des mortiers avec un caractÈre hydraulique et compatible avec les anciens batis. Pour ce faire on a élaboré des mortiers avec la substitution des quantités de métakaolin et de ciment naturel de 10, 20, 30, 40, et 50% des masses de la chaux aérienne utilisée, à cette composition, nous avons ajouté un adjuvant hydrofuge de type (Médaflow 30). Les propriétés physiques et mécaniques des mortiers obtenus ont été analysées à 14 et 28 jours de durcissement. On a trouvé que la valeur maximale à 28 jours de la résistance à la flexion est de (0.69 MPa) et à la compression est de (2.07 MPa), correspondant à 20% de ciment naturel et 2% d'adjuvant. Les résultats ont montrés aussi que la valeur minimale de l'absorption d'eau à 28 jours est de (10.73%) et a été atteinte à 20% de métakaolin et 2% d'adjuvant .Les résultats montrent que le ciment naturel et le métakaolin peuvent être employés comme ajout dans les mortiers de chaux, pour améliorer leur compatibilité avec les mortiers de restauration.

Keywords: *Chaux aérienne, métakaolin, ciment naturel, mortier, résistance mécanique, absorption.*

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ETUDE COMPARATIVE DE TROIS GISEMENTS DU MINERAI DE PLOMB/ZINC : GISEMENT CHAABET EL-HAMRA, GISEMENT D'EL-ABED ET GISEMENT D'AMIZOUR

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ABSTRACT

Le minerai de plomb/zinc se trouvent en Algérie dans plusieurs gisements, parmi ces gisements on distingue : le gisement Chaabet El-Hamra (Sétif), le gisement d'El-Abed (Tlemcen) et le gisement d'Amizour (Bejaia). Le gisement de Chaabet El-Hamra est situé dans la wilaya de Sétif, environ 250 km au Sud-Est d'Alger et à 50 km au Sud de Sétif, dans la région de Chouf-Bouarket à 4,5 km d'Ain-Azel. Le gisement d'El-Abed est situé au Nord-Ouest de l'Algérie, à la frontière Algéro-Marocaine, à 96Km au Sud-ouest du Chef Lieu de la Wilaya de Tlemcen et à 6Km de la Commune de Bouihi qui est rattachée à la Daïra de Sidi Djillali. Le gisement d'Amizour est considéré comme les plus grands gisements polymétalliques en Algérie, il est situé à 10 Km de la ville de Bejaia et à 2 Km de la route nationale N° 26, il porte pour nom « gisement d'Ait Bouzid ». L'objectif de notre travail est de caractériser les minerais de plomb/zinc des trois gisements par différentes méthodes d'analyses à savoir : 1) analyse minéralogique dans le but de réduire la taille des particules de tout venant par concassage en suite un classement dimensionnel par tamisage pour mettre en évidence le comportement de chaque fraction granulaire, afin de déterminer la classe de coupure, ainsi la composition de chaque tranche et sa proportion pondérale ; 2) analyses physico-chimiques par différentes techniques tels que (DRX, FRX, MEB et FTIR) ; 3) étude de comportement thermique par ATG-ATG et DSC.3

Keywords: *Minerai de plomb/zinc, granulométrie, composition minéralogique et chimique, caractérisations.g*

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SIMULATION DE L'INFLUENCE DE L'ADHERENCE FIBRE-MATRICE DE BETON SUR LE COMPORTEMENT EN CISAILLEMENT DES POUTRES

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ABSTRACT

Dans ce travail on introduire le comportement des fibres métalliques dans le modÈle de Kachi, déjÃ développé pour l'analyse du comportement en cisaillement jusqu'Ã rupture des poutres en béton armé et /ou précontraint, renforcées par des fibres métalliques, soumises Ã l'effet combiné d'un moment fléchissant, d'un effort normal, et d'un effort tranchant. Pour une section de poutre donnée, elle est définie par une succession de couche de béton et d'éléments longitudinaux d'acier. Chaque couche est définie par sa hauteur hi, sa largeur bi, les fibres métalliques seront quant Ã elle définies par un pourcentage en volume. Le modÈle devrai permettre alors l'analyse des poutres avec des formes de section et des détailles de ferraillage variables. Il sera alors capable de prédire l'influence de l'adhérence fibre métallique-matrice de béton sur l'effort tranchant. Chaque couche de béton et chaque élément longitudinal d'acier est alors analysé séparément mais la condition d'équilibre de la section est satisfaite globalement. Enfin le modÈle est développé pour le cas de sollicitations planes $Ify =0$, on peut alors étudier des sections soumises Ã une flexion composée avec un effort tranchant.

Keywords: *Effort de cisaillement, contrainte d'adhérence, béton de fibres.*

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THE EFFECT OF STRETCHING TEMPERATURE AND MACROSCOPIC POLARIZATION ON STRUCTURE AND MICROSTRUCTURE IN THE POLY (VINYLIDENE FLUORIDE) (PVDF)

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ABSTRACT

Poly (vinylidene fluoride) (PVDF) films in the alpha phase were stretched to different electro-thermo mechanical treatments. The effect of stretching and polarization temperature as well as the electric field on the evolution of structure and microstructure has been studied by X-ray diffraction. The degree of crystallinity of unscratched film is found to be lower than the stretched one. As the stretching and polarization temperature increase, the degree of crystallinity decreases, while it increases with the electric field. Stretching at a temperature lower than 80°C induces a phase transition alpha to beta, while the thickness of the lamellae does not change significantly.

Keywords: *mechanical deformation, Thermo, PVDF, Polymers, Crystallinity.*

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ETUDE DU COMPORTEMENT DES CIMENTS CHARGES DE BOURBIER

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ABSTRACT

Durant les activités de forage, de larges quantités de fluides de forage appelés également boues de forage sont utilisés, et par conséquent des rejets sont générés : une moyenne entre 1500 et 2500 m3/puits. Ces rejets, sont composés de fluides résiduels à base d'eau (WBM) ou d'huile (OBM), et des déblais de la roche forée (cuttings). Les boues de forage sont des fluides complexes pouvant être à base d'eau (WBM : Water-Based Mud) ou d'huile (OBM : Oil-Based Mud), avec plusieurs additifs organiques et minéraux, selon les phases du puits. En raison de leur composition chimique, ces boues présentent un grand potentiel polluant pour l'environnement, surtout dans cette zone aride oÃ¹ le système aquifÈre, fossile et trÈs peu rechargeable, constitue la ressource unique d'eau potable. En particulier, la ville de Hassi Messaoud (60 000 habitants) est située dans le champ pétrolier oÃ¹ 90% des fluides utilisés sont des OBM. Ainsi, pour minimiser leur pollution, ces boues subissent une série d'opérations de séparation (mud cleaner, centrifugation verticale et horizontale,..) à leur sortie du puits, et des traitements ultérieurs par stabilisation/solidification ou désorption thermique aprÈs un séjour de quelques semaines ou quelques mois, dans le bourbier. Cependant, en plus de leur grande consommation énergétique et matérielle, ces procédés peuvent également causer une pollution secondaire, par émissions de gaz, et relargage de métaux lourds à partir des cuttings traités. Ainsi, l'une des préoccupations majeures dans les systÈmes de gestion des boues de forage pétrolier est la réduction de leurs impacts environnementaux. Dans cette optique, notre travail consiste à recycler ces boues de forage et leur valorisation dans la formulation de ciments destinés aux travaux pétroliers et contribuer à l'étude de leurs propriétés physico-mécaniques et chimiques.

Keywords: *Ciment pétrolier, ajout, bourbier, forage, environnement*

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EFFECT OF WOOD FLOUR AND SURFACE TREATMENT ON IMPACT STRENGTH AND ROUGHNESS OF COMPOSITE

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ABSTRACT

As a result of growing environmental consciousness, the issues of sustainability and industrial ecology are guiding the development of the next generation of materials and processes. The interest in fibers derived from natural sustainable sources has been growing, as a result of their potential use in high performance composite materials. Many types of natural fiber have been identified as having appropriate mechanical properties for structural applications. However, natural fibers are hydrophilic in nature and exhibit poor interfacial adhesion between fiber and matrix. Modification of the fiber surface by chemical methods, such as alkalization, benzoylation and acetylation, has been used by researchers to improve this shortcoming. In this work we have study the effect of the wood flour's addition and their mercerization treatment (5% wt NaOH) on the properties of polypropylene/wood flour (PP/WF) composite. The results of impact test show a decrease in impact resistance of the composite with the increase of wood floor content. However, a certain improvement after the modification was observed. In addition, according to the results of microscopy with atomic force AFM, the roughness of PP/WF composites decreases with the alkaline treatment of the floor's surface. Â

Keywords: *Mercerization, Wood floor, Surface treatment, Composite, Mechanical properties.*

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EFFECT OF SODIUM SULFATE IN A MORTAR INCORPORATING METAKAOLIN

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ABSTRACT

Metakaolin is a pozzolanic addition, it has developed as a partial substitution of cement to reduce cement consumption and improve the durability of concrete. However, the incorporation of metakaolin introduces, at early age, a lack of mechanical performance of concretes at room temperature. This work aims to chemically activate metakaolin in cement past in such a way that, the same early age performance can be achieved in concrete as achieved without metakaolin. The study was carried out at cement mortar to observe the influence of sodium sulfates on compressive strength. The increase in resistance at early age was observed with the activation of metakaolin. The metakaolin activation was confirmed in cement matrices by physio-chemical analyses. The increase in compressive strength at early age can be explained by a decrease of porosity, an increase in the amount of C-S-H and a decrease in the amount of CH.

Keywords: *Compressive strength, Mortar, Chemical activation, Metakaolin, Sodium sulfate*

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SYNTHESIS AND CHARATERIZATION OF STRUCTURE AND MAGNETO-TRANSPORT PROPERTIES OF LA0.7CA0.18BA0.12MN0.95SN0.05O3 COMPOUND

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ABSTRACT

The mixed valence perovskite manganite La0.7Ca0.18Ba0.12Mn0.95Sn0.05O3 has been synthesized by conventional solid state reaction. Structural, resistivity and magnetoresistive properties have been experimentally characterized. The structure was characterized by X-ray diffraction technique. Patterns refinement by FULLPROF software confirms that our compound crystallized in an orthorhombic symmetry with Pnma space group. Crystallite size was estimated to be about 30 nm. Electrical resistivity measurements are carried out by four probe method in the range of 20-300K under zero and 1 Tesla external magnetic field. The resistivity curves present metallic character in low temperature region and semiconductor character in high temperature range separated by metal to insulator transition at TMI= 197.72K. The magnetoresistance curve (MR) (MR(%)=[(Ï • (0)-Ï • (H))/Ï • (0)].100) shows a small peak at T=179,72K and reaches the maximum at very low temperature (MR=23.19% at 34K). TMI shifts slightly from 197,72K to 204,05K with applying a 1 tesla magnetic field. A very low negative magneto-resistance was observed between 257,37K and 300K. Different conducting mechanisms fitted well our electrical results in different temperature regions. Motts variable range hoping activation energy, hopping distance and hopping energy were carried and discussed.

Keywords: *Low temperature electrical models, Magnetoresistance, Electrical resistivity, Simple perovskite manganites, Variable range hopping model.*

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CRYSTAL STRUCTURE AND MAGNETO-ELECTRICAL STUDIES OF LA1.4PR0.2CA1.2BA0.2MN2O7 RUDDLESDEN-POPPER MANGANITE

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ABSTRACT

In this work, we report the synthesis and structural, electrical and magnetoresistance properties of Ruddlesden-Popper manganite type with formula La1.4Pr0.2Ca1.2Ba0.2Mn2O7. The sample was synthetized by solid state route. The X-ray pattern refinement, using Jana2006 software, shows that the sample is crystallized mainly in a tetragonal structure, with I4/mmm space group. Minor secondary phase were detected. It was found that it referred to an rhombohedral simple perovskite structure with space group . Electrical resistivity measurements in the range of 20K-300 K, under zero and one tesla magnetic field, presents a metal-insulator transition TMI at 79 K and shifts to 82 K with magnetic field, indicating the enhance of the metallic state at low temperature. The MR% maximum reaches a relatively large value 51.69% at ~63 K under 1 Tesla. In the metallic region (T

Keywords: *Magnetoresistance, Electrical resistivity, Manganites, Popper, Ruddlesden, Percolation model.*

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NON-DESTRUCTIVE CONTROL OF HIGH DENSITY POLYETHYLENE (HDPE) PLATES WELDED BY FRICTION STIR WELDING (FSW)

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ABSTRACT

The purpose of this work is the control of high density polyethylene (HDPE) plates welded by FSW technique. The characterization is done by non-destructive control (X-Radiography) for welded and non welded joints.

To do this work, a series of experimental tests performed on several parameters: - the geometry of the welding tool (pin).

- the speed of rotation of the tool,
- the feed speed of the tool,

In this work, all these parameters are taken in account. The results obtained were satisfactory and show the influence of these parameters on the quality of the joint.

Keywords: *X, destructive control, non, High Density Polyethylene (HDPE), Friction Stir Welding (FSW), Radiography*

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ANALYSIS STRUCTURAL AND CHEMICAL OF NEW CEMENT BASED ON EGGS SHELL AND SAND DUNE STABILIZED BY PET

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ABSTRACT

In the present work, geopolymers and its homologue hybrid geopolymer have been synthesized from eggs shell fly ash (ESFA) using NaOH and Na2SiO3 of sande dune as activators and organic polymer like polyethylene terephthalate (PET) [1-2]. Some parameters like alkali concentration, amount of Na2SiO3, content of PET have been varied in order to improve the quality of geopolymeric and hybrid geopolymeric products [3]. The main objective of this study was to investigate the potential utilization of polyethylene terephthalate PET waste in cementitious matrix, as substituent to cement, to develop light weight construction materials and for preventing chemical attacks or repairing various reinforced concrete structures. The effect of the addition of the organic composite (PET) on the morphology of the geopolymeric material and on the interfacial zone between the matrix and the aggregate was investigated by means of optical and electronic microscopy [4]. The present investigation deals with the chemical synthesis of cementitious material using fly ash of eggs shell rich in calcium (Ca) and sand dune (southern of Algeria) rich in silica(SiO2). The microstructural analysis here discussed, refers to the specimens containing 5% by weight of PET. We observed PET contents have altered significally the structure and the morphology of the samples. The composition is the most compressive resistant with a maximum stress of 49.71 MPa, the most flexible (E = 2.63 GPa) and the most ductile (Îµr = 65.42 %).The characteristic properties of the chemically synthesized cementitious materials were analyzed by the chemical composition analysis XRF, XRD and SEM analyses.

Keywords: *gel reaction, sol, sand dune, geopolymer, cement, Keywords: fly ash, eggs shell.*

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CARACTERISATION DE LA CALCARENITE DES THERMES DE L'OUEST DE CHERCHEL

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ABSTRACT

Les vestiges architecturaux et archéologiques de cherchel; l'ancienne Caesarea de la Maurétanie mettent en avant des méthodes de construction et des traditions architecturales particulières au Maghreb antique. Dans le but de constituer une base de données pour orienter les recherches ultérieures sur la problématique de la conservation du patrimoine bâti, la présente étude est menée pour la première fois sur l'identification de la nature pétrographique et les caractéristiques physico-mécaniques de la calcarénite, principale roche utilisée au niveau des thermes de l'Ouest de cherchel. Ces grands édifices thermaux, datant de la fin du IIe siècle ou au début du IIIe siècle après J.C., sont construits à partir d'un mélange fait de briques plates et de blocages en pierres de lithologie diverse, dont presque 90% est de la calcarénite. La pierre en question a fait l'objet de prélèvements, d'études pétrographiques en lames minces ainsi que de tests en laboratoire; les résultats montrent qu'il s'agit d'une calcarénite de type grès tyrrhénien, qui est un calcaire gréseux bioclastique . L'abondance des éléments figurés et leur cimentation intense par les carbonates rendent la roche très compacte et utilisable dans la construction. La porosité est cependant, très élevée; cela facilite la circulation des eaux et augmente donc les phénomènes d'érosion. Les résultats physicomécaniques obtenus sur les échantillons étudiés sont faibles par rapport aux critères demandés.

Keywords: *Thermes Ouest de Cherchel, calcarénite, caractérisation physicomécaniques, propriétés pétrographiques*

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STUDY OF XANTHATE (KAX) ADSORPTION ON GALENA

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ABSTRACT

The adsorption of anionic collectors (xanthate) on the surface of galena was studied using diffuse reflectance FTIR (DRIFT) and scanning electron micrograph (SEM) techniques. The effect of sulphite interaction with galena on the mechanism of potassium amyl xanthate (KAX) adsorption onto galena surfaces has been studied in situ using electrochemical potential, FTIR spectra and SEM have been used to identify the mechanism of interaction between sulphite and galena surfaces. Activated galena with copper sulfate (10-4M) has been investigated at pH 9.5 and potassium amyl xanthate (3.10-2M) concentration. Potential (Eopt (PbS) = +55mV); Adsorbed colloidal (Pb-AX, 1109-1384 Cm-1) is found even at high xanthate concentration, colloidal lead oxide/hydroxide particles have been imaged after 10-4M lead sulfate addition at pH 9.5. The behaviour of this system is consistent with ion exchange between xanthate and hydroxide followed by oxidation to dixanthogen (X2, 1276Cm-1) and diffusion of this species across the surface. As results: 1. The potassium amyl xanthate has good collector ability on a sulphide mineral galena. 2. Activation of galena at lower potentials increases the copper uptake by the mineral. 3. Oxidation of galena at potential of +55 mV forms CuS product on galena in water for 10 min. 4. Using the SEM technique action of 3.10-2M potassium amyl xanthate has been identified (adsorption to specific surface sites and colloidal precipitation from solution). 5. The FTIR spectra revealed the presence of copper on the surface of galena and this is confirmed the adsorption of KAX onto surface (Pb-AX,1109-1384 Cm-1,X2,1276 Cm-1).

Keywords: *SEM, Adsorption, Xanthate (KAX), Galena, FTIR*

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ETUDE DE L'INFLUENCE DES CARACTERISTIQUES DES GRANULATS LOCAUX SUR LES PERFORMANCES DU BETON AUTOPLAÇANT (GRANULATS DE LA REGION DE MEDEA)

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ABSTRACT

La variété de la roche dans la nature donne une multi-source de granulats pour le béton avec différentes caractéristiques, donc le marché de granulat se caractérise par un grand nombre de producteur pour un millier d'exploitation de tailles diverses, ce qui nécessite de prendre un grand soin dans le choix du type et de la source de granulat. La région de Médéa -80km sud d'Alger- et selon sa nature géologique, contient plusieurs zones montagneuses qui donnent une variété de roche de nature calcaires et grés et une multi-source de granulats pour le béton avec différentes caractéristiques. Pour le but de connaitre le facteur principal dans le choix du squelette granulaire et la nature de la roche source de granulat dans une formulation optimale du béton autoplaçant, ce travail consiste à étudier l'influence des caractéristiques des granulats locaux de la région de Médéa sur les propriétés physiques et mécaniques du béton autoplaçant (BAP) à travers un nombre d'essais à l'état frais et à l'état durci. Les résultats trouvés ont montrés que les granulats locaux de la région de Médéa utilisés dans le cadre de ce travail, répondent aux exigences des normes en vigueurs exception pour la dureté faible du gravier de la région de Boughezoul (grés). Le mélange optimal pour avoir la meilleure fluidité et propriétés mécaniques est celui confectionné par du sable corrigé avec le gravier de la région de Kaf El Assel (calcaire).

Keywords: *résistances, granulats, Béton autoplaçant, superplastifiant.*

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OPTIMISATION OF THE PREPARATION CONDITIONS OF THE HYDROGELS BASED ON OSA STARCH/GELATIN

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ABSTRACT

Hydrogels are a scaffold material suitable for a variety of tissue engineering applications. The combination of anhydrous octenyl succinic starch (starch OSA) with gelatin (class a), leads to the formation of a soluble complex, whose physicochemical conditions namely the molar ratio, the pH and the ionic strength were optimized by modeling response surfaces. The rheological analysis of the systems showed that the behavior was non-Newtonian and could be modeled by the Carreau model. Exploration of the RSM model of resting viscosity Î·0, loss angle, turbidity, and phase separation was used to determine the iso-response contours and to identify areas in which gels were obtained without recording a phase separation. According to the mathematical models generated by this method, an optimal formulation of ratio Z = 0.3 and pH = 6 and CNaCl = 0.01M was identified, characterized by FTIR which demonstrated the formation of the complex, by the appearance of the band at 1545 cm-1, by electrostatic interactions. The rheological characterization in oscillatory mode shows a decrease in conservation modulus G 'and the increase of the helix-pelota transition temperature of the gelatin from 37 ° C to 48 ° C.

Keywords: *Electrostatic complex, gelatin, OSA starch, Hydrogels, rheological behavior.*

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AB-INITIO CALCULATIONS OF A NEW HALF METTALIC HEUSLER ALLOY RU2MOSB

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ABSTRACT

We have investigated structural, electronic, magnetic and elastic properties of Ru2MoSb full Heusler alloy using the full potential linearized augmented plane wave (FP-LAPW) method based on density functional theory (DFT) and implemented in Wien2k code. Three approaches are employed to model exchange correlation potential: GGA, GGA+U, mBJ_GGA+U. we have computed the Hubbard on-site Coulomb interaction correction U by constraint local density approximation for both 4d elements Ru and Mo. Our material is half-metallic, ferromagnetic stable in the Cu2MnAl structure which make it a new candidate for spintronic applications. Elastic properties unveil that our alloy is mechanically stable, has a ductile character, an anisotropic nature and predominant ionic bonds. Formation energy and cohesion energy values indicate the possibility of synthesizing and stabilizing this material experimentally. So far, no theoretical or experimental studies have been reported regarding this alloy, we hope that our predictions will be checked experimentally in the future.

Keywords: *metallic, half, DFT+U, Full Heusler, elastic properties.*

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AB-INITIO INVESTIGATIONS OF STRUCTURAL, THERMOELECTRIC PROPERTIES OF PROMISING HALF-METALLIC FERROMAGNETISM FLUORO-PEROVSKITE NACOF3

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ABSTRACT

We report on the structural, mechanical, magneto-electronic and thermoelectric properties of cubic sodium based fluoro-perovskite NaCoF3 through density functional theory (DFT). The generalized gradient approximation of Perdew-Burke and Ernzerh (GGA-PBE) and the Tran-Blaha modified Becke-Johnson potential (TB-mBJ) are used for modeling exchange-correlation effects. The calculated lattices parameters agree well with the experimental measurements. Elastic properties show that this compound is mechanically stable. The results of spin-polarized band structure show a half-metallic behavior of NaCoF3. The magnetic study of material shows that the nature of these compounds is ferromagnetic and the integer value of the total magnetic moment confirms the half metallicity for this material.

Keywords: *elastic constants, magnetic properties, structural properties, Density functional theory, Fluoroperovskites, thermoelectric properties*

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ANALYSIS OF CONCRETE ACCELERATED AGING UNDER MECHANICAL AND HYGRO-THERMAL SOLICITATIONS

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ABSTRACT

Concrete material in the existing structures, can be damaged by physical and chemical damages. Therefore, it is necessary to understand these different defects properly in order to get more realistic evaluation of its service life. This work is devoted to the experimental analysis of the accelerated aging of a concrete element under the combined effect of a hygrothermal cycle and a longitudinal compression loading. Prismatic concrete specimens 7x7x28 cm3 are used. Ultrasonic testing is used for detecting damages in concrete element. Specimens are subjected to accelerated aging cycle. This cycle consist of mechanical sollicitatio (longitudinal compression loading with different percentage of maximum load) and hygrothermal solicitations (immersion in water for 24 hours, dried in free air for 24 hours and 12 hours at a temperature of 60Â°C). Results obtained illustrate the separate and combined effect of the hygrothermal cycle and mechanical compressive loading. Results show after a number of cycles, a decrease in ultrasonic wave propagation velocity which indicates degradation of concrete. we notice that more the loading is more important, the decrease of the ultrasonic wave propagation velocity is remarkable. By considering hygrothermal effect, we notice that there is decrease in the ultrasonic wave propagation velocity which indicates degradation of concrete. However, this effect remains less than the effect of load applied and less than the combined effect of hygrothermal cycle and load. From load displacement curves we can conclude that degradation on concrete element is confirmed by the loss of rigidity.

Keywords: *hygrothermal, accelerated aging, concrete, degradation*

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SENSIBILITE DES PARAMETRES ACOUSTIQUES A LA FISSURATION DES BETONS AVEC DIFFERENTES FRACTIONS GRANULAIRES

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ABSTRACT

Le béton est un matériau vulnérable vis-à-vis des actions engendrant des tractions dans les éléments qui favorisent l'apparition de différents types de fissures. En général, une fissure est considérée comme une discontinuité dans le champ de déplacement à travers lequel les contraintes de traction sont nulles ou diminuent en fonction de l'ouverture de cette même fissure. La fissuration gouvernée par des contraintes de traction se distingue en premier par une étape de microfissuration. Ces microfissures se connectent pour créer une ou plusieurs macrofissures caractérisant ainsi une phase de localisation de la fissuration. La propagation des macrofissures conduit à l'endommagement et à la rupture du volume du béton considéré. Cette proposition de communication présente les résultats d'un travail expérimental associant la technique d'émission acoustique au suivi de fissuration lors d'un essai de flexion trois points. Le principale paramètre variable est la composition granulaire des bétons. De la phase microfissuration à l'endommagement des éléments sous flexion nous mettons en exergue les relations entre les caractéristiques mécaniques, de ruptures et de quelques paramètres de l'émission acoustique.

Keywords: *émission acoustique, ouverture de fissure, essai de flexion, Béton, énergie de rupture.*

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ÉTUDE EXPERIMENTALE ET STATISTIQUE DES COMPOSITES A MATRICE POLYMERE RENFORCES PAR LES FIBRES DE JUTE EN FLEXION

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ABSTRACT

Les composites à fibres naturelles sont des nouveaux matériaux qui se développe de plus en plus à nos jours et remplace les fibres synthétiques, dans tous les domaines d'ingénierie, en raison de leurs propriétés, leurs disponibilité ainsi que leurs coûts. Dans ce travail, une analyse statistique des caractéristiques mécaniques en flexion a été effectué sur des composites polymères thermodurcissables (résines polyester et époxy) renforcés par des fibres de jute, en utilisant la méthodologie de surface de réponse (RSM).à cet effet, les essais de flexion trois points ont été réalisé suivant un plan expérimental de trois facteurs (type de traitement chimique, fraction volumique et durée de traitement) à trois niveaux. Les résultats obtenus ont été analysé par l'analyse de la variance ANOVA. Ensuite, une optimisation par la fonction de désirabilité a été effectuée. Cette dernières nous a montré que l'utilisation de traitement NaHCO3 pour une durée entre 4 et 12h avec une fraction volumique maximale (20%) pour les deux types de résine polyester et époxy permet de maximiser la contrainte de flexion maximale et le module de flexion.

Keywords: *caractéristiques mécaniques, ANOVA, fibres naturelle, flexion, RSM.*

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THE BEHAVIOR OF A HIGH-STRENGTH CONCRETE BASED ON RECYCLED WASTE

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ABSTRACT

The purpose of this study is to determine the feasibility of the partial replacement of cement with recycled waste in a high-strength concrete whose purpose is to minimize the use of Portland cement and reduce the environmental impact of this waste. In this context, we used the limestone dust in the from of fillers, from Ben Azzouz - Skikda quarry as a partial replacement of cement with substitution rates of 5, 10, 15, 20, 25 and 30%, and we studied the behaviour of the concretes in the fresh state (density and workability) and the mechanical performances (compressive strength, flexural tensile strength and gain in weight) in the hardened state, then compared the results found it with the control concrete of 0% substitution rate. It can be concluded that the introduction of recycled waste of limestone increases the density and workability and improves the mechanical performance of high strength concrete according to the rates of substitution.

Keywords: *high strength concrete, properties, limestone, waste, Substitution*

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ETUDE ET CARACTERISATION DU BINAIRE TEO2-BI2O3

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ABSTRACT

Afin de répondre à une demande toujours croissante dans le domaine des communications et de la mémorisation de l'information, de nombreuses recherches ont porté sur le développement des systèmes tout optiques ou électro optique pour la détection, le stockage et le transfert de l'information. La compétition qui règne sur la mise au point de tels systèmes optiques se concentre depuis quelques années sur la synthèse et l'optimisation de matériaux optiquement non linéaires. Parmi les divers matériaux candidats à de telles applications, les verres inorganiques à base d'oxyde de métaux lourds sont très prometteurs en raison de leur facilité de mise en forme, leurs faibles coefficients d'absorption dans le visible et le proche infra rouge et leur résistance à l'endommagement. Nous avons étudié le système TeO2-Bi2O3 en partant d'un mélange 80%TeO2 et d'un mélange 82,5%TeO2. Ces mélange ont été broyés à différents temps, puis traités à 1100K et 1200K et enfin trempés dans l'eau. Ces échantillons ont été observés par Microscopie électronique à balayage et par diffraction des Rayons X. Les micrographies MEB montrent des formes dendritiques ou lamellaires, caractéristiques des matériaux vitreux transparents. Les clichés DRX montrent l'apparition d'une nouvelle phase Bi2TeO5, phase qui n'a pas encore été observée à cette température et avec ces proportions

Keywords: *la simirnite(Bi2TeO5), vitro cÃ©ramique, dioxyde de Tellure, optique non linÃ©aire*

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PHYSICO-CHEMICAL CHARACTERISTICS OF DJEBEL ONK PHOSPHATE ORE BY DIFFERENT METHODS

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ABSTRACT

Phosphate is found under different mineralogical species, of which the most widespread is the crystallized fluorapatite crystallized in the hexagonal system. The term phosphate can be used to describe all compounds that contain the P-O bond, while orthophosphates are constructed from the PO4 tetrahedral unit. The deposits exploited in several parts of the world are presented with very contrasting chemical and physical properties. The physicochemical studies which were undertaken by various methods of qualitative and quantitative analyses (IR, DRX, SEM, ATG, MO... etc), should allow, to propose suitable methods of treatments for phosphate ore enrichment by the elimination of the undesirable matters. The aim of this study is the analysis by different methods of different fractions of phosphate rock or. This study makes it possible to determine the nature and structure of various minerals that make up this mineral (quartz, calcite, dolomite, apatite). The examination of these fractions it has been found that there are richer fractions than the others.

Keywords: *processing, characterization, Phosphate*

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THE EFFECT OF DEFLOCCULANT TYPE ON THE RHEOLOGICAL PARAMATERS OF A CASTING SLIP CONTAINS ALHADJAR BLAST FURNACE SLAG FOR SANITARY CERAMICS

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ABSTRACT

A traditional porcelain is a material that consists mainly of quartz, feldspar, kaolin and clay. Feldspar is the inexpensive material, the vitreous phase in the fired component is formed by decomposition of the latter and the interaction with crystalline phases, The present work investigates the effect of feldespar substitution by the blast furnace slag (a by-product of the ELHADJAR -Algeria mill) on the process of densification of a porcelain. The work is focused on a number of variants (mixtures) each having a rate in blast furnace slag whose main contents vary from (0, 5, 10, 15 and 20%), The preparation of the mixture was carried on raw materials which are: hycast clay, parkaolin. RMD kaolin, sodium feldspar (Na) and potassium feldspar (K), BIR ALATER sand and ALHADJAR blast furnace slag, to which silicate and soda ash have been added as deflocculants (Na2CO3 + Na2SiO3), in order to improve the rheological parameters of the slip and the casting process. The deflocculants were added at different ratios (Na2CO3 / Na2SiO3) in order to deduce the optimal ratio. Then, we add percentages 0.1, 0.2,0.3,0.4 and 0.5% of this mixture of two deflocculants to deduce the content that corresponds to the lowest possible viscosity. The study of the rheological properties of the different mixtures and with the different ratios in deflocculants enabled us to choose the Na2CO3 / Na2SiO3 = 1.5 ratio. The rheological properties were studied in order to chronologically follow the effect of slag on: density, viscosity, thixotropy and pH. Then, we look for the added deflocculant content in order to obtain the least possible viscosity, ALHADJAR blast furnace slags have a sufficient chemical composition and are used in the formulation of pastes of ceramics sanitary.

Keywords: *slip casting, density, blast furnace slag, viscosity, rhéological paramaters*

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STUDY BY RESISTIVITY MEASUREMENT AND THERMOELECTRIC POWER OF PHASE TRANSITIONS OF MATERIALS AS A FUNCTION OF TEMPERATURE AND TIME

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ABSTRACT

Electronic transport properties are important means in understanding materials and in certain industrial processes. They are directly related to atomic structure, crystal lattice, grain size and growth, defects, diffusion, intermetallic phase formation, nucleation, precipitation, aggregation, to dislocations, and gaps ... etc. The modification of the "structure" will lead to a modification of the electronic transport properties. Therefore, electronic transport can be used to characterize changes in the solid, especially phase transformations and their kinetics.As a result, the formation of new phases, the local modification of the composition or the presence of impurities cause a modification of the resistivity and the absolute thermoelectric power which become very sensitive probes for characterizing a material and its phase changes. The principle of the method used is based on the four-wire DC technique for resistivity measurements and the temperature difference (Î”T) method with constant gradient for thermoelectric power measurements. We first briefly present a very user-friendly "labView" program3 to pilot an automated experimental device for simultaneous measurement of resistivity and ATP as a function of temperature or time (at constant temperature) of hours and days. The device and the program allow us to carry out our measurements in the laboratory between 170 K and 1500 K. The "labView" program can measure either simultaneously or separately the electrical resistivity and the ATP.

Keywords: *Activation Energy, Absolute Thermoelectric Power (ATP), Electrical Resistivity, Phase Transitions.*

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USE OF THERMALLY ACTIVATED BENTONITE AS SUPPLEMENTARY CEMENTITIOUS MATERIALS: EFFECT ON SELF-COMPACTING MORTAR

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ABSTRACT

With the current focus on sustainability, it is necessary to evaluate cement's environmental impact properly .This research focuses on the effect of using Calcined Bentonite (CB) as partial replacement of Ordinary Portland Cement (OPC) in self compacting mortar (SCM) As a solution to reduce CO2 emissions from the cement industry. The cement in SCM was replaced with the CB at 0%,5%, 10%,15%, 20%, 15% , 25% and 30% by the weight of cement. Various tests were performed at ages of 7 and 28 days . The using of CB in SCM demonstrated a reducing in their fresh properties. At hardened state, incorporating 10% of CB increases the mechanical strengths (up to 35.81% at 28 days). It can be noted that it is possible to produce a green SCM when the cement is partially substituted by the CB.

Keywords: *activation, pozzolanic reaction, Calcined bentonite, Self compacting mortar, substitution.*

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SYNTHESIS, CHARACTERIZATION, AND SWELLING BEHAVIOR OF PH RESPONSIVE CARBOXYMETHYL CELLULOSE-G-POLY (ACRYLAMIDE-CO-MALEIC ACID) HYDROGELS

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ABSTRACT

Hydrogels are three-dimensional, hydrophilic, polymer networks capable of swelling in an aqueous environment. Stimuli-sensitive hydrogels undergo volume changes in response to external stimuli, such as small changes in temperature, pH, ionic strength, electric field, light and so on.. Carboxymethyl cellulose (CMC) is a representative cellulose derivative with carboxymethyl groups (-CH2-COONa) bonded to some of the hydroxyl groups on cellulose backbone. The polar carboxyl groups promise the cellulose solubility, chemical reactivity and strong hydrophilicity. So the application of CMC in superabsorbent fields has become more and more attractive and promising. The current work focuses on the preparation of a hydrophilic macromolecular matrix by performing graft copolymerization of acrylamide (AAm)/ maleic acid (MA) onto carboxymethyl cellulose (CMC) by using potassium persulfate as a free radical initiator, in the presence of N,Nâ€²-methylenebisacrylamide as a cross-linking agent. The synthesized hydrogels were characterized by Fourier transform infrared spectroscopy (FTIR) and thermogravimetric analysis (TGA). The effects of CMC composition and variation of pH solution on the swelling behavior were studied. The carboxymethyl cellulose-g-poly(acrylamide-co-maleic acid) hydrogels showed a pH responsive behavior. The described hydrogel might have great potential application in drug delivery system.

Keywords: *network, swelling, hydrogel, carboxymethyl cellulose*

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RHEOLOGY PROPERTIES OF WASTE PLASTIC BAGS MODIFIED BITUMEN

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ABSTRACT

The performance of road paving asphalt mixtures depends largely on the rheological properties of the bitumen used to bind the mixture. , Statistical figures indicate that the 5.5 billion of plastic bags that are thrown in the nature annually in Algeria represent a real threat to the environment that calls for urgent action measures. Previous studies have shown the potential of waste plastic recycling in producing high performance road paving bituminous materials. This contribution studies the effects of plastic bag waste addition on the rheological properties of the waste plastic modified bitumen (WPmB). Basic tests and dynamic rheological tests were used to characterize the modified binder. FTIR spectroscopy was also called upon to disclose the chemical functionalities present in the waste plastic modified bitumen (WPmB). Results obtained show that interesting improvements are observed on the rheological properties of the WPmB. It was found that plastic addition stiffens the bitumen; the penetration value of the WPmB decreases, and its softening point increases. The dynamic rheological results show that the plastic addition increases the complex modulus and the complex viscosity and decreases the phase angle at all temperatures and frequencies tested. Plastic addition improves the rutting resistance of WPmB according to the SHRP criterion.

Keywords: *rutting resistance., waste plastic bags, modified bitumen, bitumen*

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STUDY OF THE MECHANICAL PROPERTIES OF THE SAND CONCRETE LIGHTENED BY LIGNOCELLULOSIC MATERIALS

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ABSTRACT

The article aims to study the mechanical properties of the studied concretes, namely sand concrete without lignocellulosic materials (SC), sand concrete lightened by barley straw which content is 15 kg/m3 (BSC), sand concrete lightened by barley straw and wood shavings which content is 35 kg/m3 (BWSC) and sand concrete lightened by wood shavings which content is 60 kg/m3 (WSC). The objective is to target the best composition of the three lightweight sand concretes which constitutes the best compromise between the studied properties. The first part of this study was devoted to the study of the mechanical properties, namely the flexural strength and compressive strength, the modulus of elasticity in flexion and compression. However, the second part was reserved to study analysis of the cracking of studied concretes by video microscope in order to appreciate the effect of lignocellulosic materials on toughness and ductility. The results obtained show that as the content of lignocellulosic materials increases, the mechanical properties decrease as was predictable. Another relation between the porosity accessible to water and the compressive strength of the studied concretes was found. This relation is defined according to a polynomial equation whose correlation coefficient approaches 1. The analysis cracking shows the advantageous effect of barley straw, separate and in combination for cracking compared with wood shavings alone. Nevertheless, the advantage is in favour of concrete (BWSC), from the point of view of improving the deformation capacity of concrete, that is to say ductility and toughness, this is mainly due to the particularity of barley straw in terms of tensile strength, straw flexibility, geometric shape and surface appearance. This particularity of the barley straw is an advantage over the wood shavings, it may contribute favourably to improuve of the ductility and consequently to increase the resistance to the propagation of the crack.

Keywords: *Lightweight sand concrete, Lignocellulosic materials, Mechanical properties, Cracking, Ductility*

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EFFECT OF CHORFA DREDGED SEDIMENTS ON THE MECHANICAL STRENGTHS AND CAPILLARY ABSORPTION OF COMMON CONCRETES.

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ABSTRACT

Hydraulic structures are subjected to significant siltation which, in a very short period of time, can make them unusable. In Algeria, the silting-up of a great number of dams, built for drinking water and for irrigation needs, implies the necessity and urgency to take action. The refore, the maintenance work, which leads to dredging the deposited silt, constitutes an unbearable obligation for the preservation of the environment. Chorfa dam (western Algeria) may be mentioned as a real example. The present study is part of a long research, which aims at proposing economically competitive formulations that are easy to implement and which enable to use the dredged materials in the formulation of common concretes by partial substitution to cement (10, 20 and 30 %) of dredged sediments, after calcination at 750 Â°C to make them active. Tests were carried out on concretes in the fresh state (setting time) and hardened state (compressive strengths and capillary absorption) in order to determine their characteristics. The results obtained confirmed the possibility to develop concretes containing calcinated silt, with proportions up to 30%, and which can meet the economical, ecological and technological objectives.

Keywords: *Calcinated silt, Common concrete, Setting time, Compressive Strength, Capillary absorption.*

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LA SYNTHESE DE M-DINITROBENZENE ET L'ETUDE DE SON EFFET INHIBITEUR SUR LA CORROSION DE L'ACIER X42 DANS L'EAU D'ALBIEN

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ABSTRACT

L'objectif de ce travail est d'étudier l'effet inhibiteur du m-dinitrobenzÈne sur la corrosion de l'acier X42 en milieu aqueux, l'eau d'Albien, une comparaison entre notre inhibiteur aminé synthétisé et l'inhibiteur commercial, le CHIMEC 1038, utilisé par l'industrie pétroliÈre Rhourde Nouss, willaya d'Illizi. La méthode gravimétrique est utilisée pour mieux comprendre l'efficacité de notre inhibiteur dans la réduction de la vitesse de la corrosion. L'inhibiteur synthétisé Ã montrer une efficacité inhibitrice Ã partir de la formation d'un film microscopique non dégradable protecteur contre la corrosion dÈs les premiÈres heures dans le milieu aqueux, avec de bons rendements d'inhibition pour des concentrations bien déterminées.

Keywords: *Acier X42., Milieu aqueux, Gravimétrique, Inhibiteur, Corrosion*

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GARLIC EXTRACT AS AN ENVIRONMENTALLY CORROSION INHIBITOR OF API X60 CARBON STEEL AND 316L STAINLESS STEEL IN SULFURIC ACID

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ABSTRACT

Corrosion processes are responsible for numerous losses mainly in the industrial field. Today, the protection against corrosion includes a variety of treatments such as cathodic protection, surface treatments or the reduction of aggressive corrosive environment by adding corrosion inhibitors for which the desired performances are evaluated in terms of metal inhibition and environmental protection. Due to high toxicity of chromate, phosphate and some organic compounds, related to various environmental and health problems, these industrial corrosion inhibitors are being unused. Many papers have been published to develop an environmentally corrosion inhibitors called " green inhibitors" from plant extracts, essential oils and purified compounds. In this work, the inhibition efficiency ofAllium sativum (Garlic) extract in the corrosion control process of API X60 carbon steel and 316L stainless steel in 1N sulfuric acid solution has been investigated using electrochemical techniques including linear polarization and electrochemical impedance spectroscopy. The results reveal that garlic extract exhibits important corrosion inhibitive performance. The inhibition efficiency which depends on the inhibitor concentration increases till 90% for stainless steel and 67% for carbon steel. EIS analysis show that the corrosion resistance was increased in medium with garlic extract indicating the improvement of the passive films properties formed on the surface of the two steels.

Keywords: *inhibitor, sulfuric acid, steel, corrosion, Garlic extract.*

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CRITICAL STUDY ON THE EFFECT OF ACTIVATOR TYPE,NAOH CONCENTRATION AND SODIUM SILICATE RATION ON THE FRESH AND MECHANICAL PROPRETIES OF BLAST FURNACE SLAG-BASED GEOPOLYMERS.

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ABSTRACT

G Geopolymers are alkali-activated aluminosilicate-based materials with pozzolanic properties with are often industrials wastes(fly ash,blast furnace slag , glass powder...) or calcined clays (metakolin) that have been the subject of increasing study in recent as they represent an alternative to traditional portland cement in ecological, economic,environmental and mechanical performance terms. This paper presents a critical study to provide an overview of research on the effect of activants types, sodium hydroxide concentration (NaOH) and sodium silicate ratio on the fresh and cured properties of blast furnace slag based mortars.The activator type and dosage of NaOH and the ratio of sodium silicate have a significant effect on the properties (consistency, setting time, compressive strength...) of the slag-based geopolymers.In fact, activation by NaOH leads to reduced setting time and the combinaison (NaOH,Na2SiO3) gives better mechanical performance,the increase in NaOH molarity also reduces setting time and improves mechanical propreties.There is a concentration threshold and silicate ratio that must be respected to have optimal properties of blast furnace slags based- geopolymers.

Keywords: *fresh properties., compressive strength, blast furnace slag, alkaline activation, Geopolymers*

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VALORIZATION OF DAM SEDIMENTS IN THE DEVELOPMENT OF PORTLAND CEMENT: EFFECT OF TREATMENT MODE

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ABSTRACT

The sedimentation of dams in Algeria is a complex phenomenon that causes real problems in several areas (economic, ecological and environmental). This plague has prompted us to conduct researches and studies to try to make a contribution to the resolution of this problem. As we know very well, the clinker-based products that are cement with all these diversities in composition and reaction gave us a wide possibility of creating structures with components recognized as wasteÂ (silica fumes, fly ash, blast furnace slag, etc.)Â and using them as cementitious additions. This inspired us to find a methodology to valorize these sediments in a cement matrix, more specifically in Self-Compacting Concrete (SCC). At the beginning, we worked on mortar because it is very similar to concrete in its composition and reaction compared with additions of fine elements. When trying several sediment treatment methods (mechanically and thermally) and several formulas and cement equations on mortar, we then applied the most optimal method in the formulation found in our Self-Compacting Concrete, with the aim of valorizing the matter into a building material that can be used in the most appropriate way possible.

Keywords: *mortar, SCC, cement, sediments, valorizing.*

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EFFET DE LA STRUCTURE GRANULAIRE DES MATERIAUX CIMENTAIRES SUR LA VITESSE D'ULTRASON

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ABSTRACT

Les structures des différentes constructions en génie civil sont appelées à reprendre et équilibrer diverses sollicitations durant leurs durées de vie. Le problÈme de la qualité du béton dans la phase réalisation couplé avec des paramÈtres dus au fonctionnement des structures en service engendrent des désordres et des défauts au niveau des éléments de la construction. Pour la quantification et qualification de ces défauts et désordres, il est nécessaire de disposer et de maitriser des méthodes d'inspection et de contrôle, qui peuvent ëtre soit destructifs ou non destructifs. La méthode de propagation d'ondes ultrasonores offre plusieurs avantages pour le matériau béton, allant de l'estimation des caractéristiques mécaniques Ã la détection et quantification de défauts. La formulation d'un béton pour des structures en génie civil ou travaux publics exige certaines caractéristiques de résistance et de durabilité. Le constituant principal qui garantie la résistance des bétons est bien les granulats et ils représentent entre 60% et 80% du volume total du béton. La porosité, et ainsi la compacité, dépendent fortement des caractéristiques des granulats et de leur volume et continuité dans la formulation. Les résultats objet de cette contribution s'intéresse à l'effet de la structure granulaire des bétons sur le temps de propagation des ondes d'ultrason et par suite les vitesses. Nous nous intéressons aussi à l'échelle du mortier et de la pâte de ciment. Principalement deux fractions granulaires continus sont utilisés avec des diamÈtres maximales différents. L'effet de la porosité et sa relation avec les vitesses ultrason sont mis en évidence.

Keywords: *diamètre maximale des granulats, fraction granulaire, Vitesse ultrason, Porosité, béton, mortier*

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FABRICATION D'UNE ÉLECTRODE A BASE DE SOUFRE POUR LES BATTERIES LI/S

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ABSTRACT

Le soufre est un matériau avantageux en tant que matériau d'électrode positive de nouvelle génération, il se compte comme un prometteur pour les batteries au lithium de haute énergie en raison d'une capacité théorique élevée de 1672 mA hg-1. Notre travail consiste a fabriqué une électrode par l'introduction du soufre avec le graphite en poudre pour assurer une conductivité électrique suffisante de la cathode (1 partie graphite pour 4 parties de soufre).Nous avons testé différentes façons de construire une électrode pratique La meilleure façon est comme suite : Un tissu de graphite est introduit dans un tube à essai de taille appropriée, ensuite un mélange de soufre et de graphite en poudre est introduit dans le tube. Le tube à essai est chauffé dans un four à 130 ° C, une fois le soufre fondu une barre de carbone est introduite dans le mélange pâteux. Après la refroidissement du mélange à température ambiante, le tube à essai est cassé pour libérer l'électrode compacte. Le tissu de graphite retient le graphite en poudre pendant la destruction de l'électrode et évite le filtrage de la solution d'électrolyte. La spectroscopie infrarouge et la microscopie électronique sur la poudre obtenue par grattage Des électrodes fabriqué ne montrent aucun signe de liaison chimique entre le soufre et carbone. Pour déterminer le champ de potentiel de l'électrode par une étude voltamétrique, une microélectrode carbone-soufre a été produite dans une pipette Pasteur.

Keywords: *batterie Li/S, électrode, soufre*

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ETUDE DES PHENOMENES DE CORROSION DES PIPES API N80 EN PRESENCE D'UN GRADIENT DE TEMPERATURE ET EN MILIEU DE L'EAU ALBIEN

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ABSTRACT

A Hassi-Messaoud, la récupération d'huile est assistée par l'injection d'eau extraite de l'aquifère Albien. Pour augmenter la capacité d'injection de l'eau, API N80 concentrique a été installé le long des puits de production, la différence entre la température des puits et celle de l'eau injectée dans le concentrique génère un gradient de température ΔT variant en profondeur et jusqu'à 16 °C. Dans cette étude, nous avons étudié l'effet de la température de trempe sur le comportement à la corrosion du tuyau (pipe) API N80 dans l'eau Albienne à différents gradients de température. La nature du dépôt de corrosion a aussi déterminé. Les résultats de polarisation pour les échantillons testés à différents ΔT montrent une diminution de taux de corrosion avec une augmentation de la température de revenu. L'analyse IRTF et DRX a révélé que l'échelle de corrosion est hétérogène et la formation de divers composés dépend fortement de la température. L'efficacité d'inhibition (IE%) le contrôle de la corrosion de l'acier N80 dans l'eau albien en présence du dichromate de potassium a été étudiée. Les résultats du courbe de Tafel et la spectroscopie d'impédance (EIS) ont montré que K2Cr2O7 pourrait agir comme un inhibiteur de type mixte avec une efficacité de protection raisonnable de ~ 89 % à 70 ppm. Le comportement d'adsorption du dichromate de potassium (K2Cr2O7) sur la surface de l'acier au carbone a été bien décrit par l'isotherme d'adsorption de Langmuir.

Keywords: *Eau Albienne, Gradient de température, API N80 pipe, Échelle de corrosion, K2Cr2O7*

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CORROSION OF ZN-MN ALLOY COATING IN CHLORIDE CONCRETE PORE SOLUTION

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ABSTRACT

In this work Zn-Mn alloy coating was analyzed as a potential replacement of zinc coated rebar. The aim was to optimize Zn-Mn plating parameters with respect to corrosion stability in alkaline environment. The alloy coating was obtained potentiostatically by electrochemical deposition in the range of potentials, starting from -1.6 V vs saturated calomel electrode, i.e. the onset of coating deposition. On the basis of deposition efficiency and coating homogeneity, several deposition potentials were chosen for further study. Surface morphology and composition of alloy coating was analyzed by SEM, while the crystal structure was examined by XRD. Pure zinc was analyzed as a reference. The corrosion rates of Zn and Zn-Mn alloy coatings were determined in three concrete pore solutions with different concentration in chloride (0.25, 0.5 and 1M), by tafel analysis. To determine the corrosion process of different coatings, electrochemical impedance spectroscopy was used, in concrete pore solutions with 0.25, 0.5 and 1M concentration in chloride. Results obtained from different test confirmed that Zn-Mn alloy coating with 16 mass% Mn, deposited at -1.8 V, showed the greatest corrosion stability.

Keywords: *chloride concrete pore solution, corrosion, Mn alloy, Zn, Electrodeposition*

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IDENTIFICATION OF INTELLIGENT COMPOSITE MATERIALS PROPERTIES IN SHEAR MODE

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ABSTRACT

This Magnetorheological elastomer composite materials (MRE) are a new class of intelligent active materials composed of ferromagnetic particles, of micrometric size, dispersed in a silicone elastomer matrix, which exhibit variable stiffness and damping properties which are modifiable under the application of an external magnetic field. Currently, these devices are primarily used in automotive and building applications, but they can easily be adapted to meet the requirements of aerospace applications. The development process and experimental characterization needed to evaluate the active control performance of this material have been made. This is done by characterizing the mechanical properties as a function of the magnetic field, as a function of the excitation frequency and as a function of the different percentage of ferromagnetic particles loading. An example of application of this material in aeronautics is also presented.

Keywords: *Shear strain, Elastic shear modulus, Loss shear modulus, Magnetorheological elastomer, Experimental analysis*

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PREPARATION AND INVESTIGATION OF STRUCTURAL, MICROSTRUCTURAL AND ELECTRICAL PROPERTIES OF LA0.5GD0.2BA0.3MNO3 COMPOUND PREPARED AT 1100Â°C

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ABSTRACT

The mixed-valence manganites with general formula La1-xAxMnO3 (where A is an alkaline or lanthanide ion) have magnetoresistance as an important feature. These materials have attracted broad attention of the scientific community for their prospective industrial applications. A huge number of potential applications are available for such materials, which include sensors, read-head, magnetoresistors and magnetodiodes, etc. In this work we present an investigation of the structural, microstructural and electrical properties of La0.5Gd0.2Ba0.3MnO3 compound prepared by the solid state reaction method. The X-ray pattern refinement results confirm that the sample crystalize in a single phase orthorhombic structure with a Pnma space group. Scanning electron microscope (SEM) micrograph shows a granular and porous character, and the grain size is estimated to be between 0.4 and 0.5Âµm. Energy dispersive spectroscopy spectrum (EDS) confirms the high purity of the sample indicating the presence of only the constituting elements. The characteristic bands around 382 and 593 cm-1 in the recorded FTIR spectrum corresponding to bending and strenching modes of the metal-oxygen bond in the perovskite were observed. Four-probe resistivity curve shows the metal-insulator transition at 89.37 K and an upturn at 68.35K. Debye temperature was estimated to be 129.43 K. The simulation results show that a combination of residual resistivity, weak localization, electron-electron and electron-phonon interactions fitted well our resistivity results at low temperature. In the high temperature range, it is found that 3D-Mott's variable range hopping model is the best one to fit our curve. The corresponding mean hopping energy is estimated to be between 0.07 and 0.14 eV, whereas the mean hopping distance is estimated to be between 4.28 and 3.24 nm which equals several times of Mn-Mn distance. This is suitable to 3D-VRH.

Keywords: *Mott's variable range hopping, 3D, magnetoresistance, simple perovskite, resistivity.*

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ANTIOXIDANT ACTIVITY OF PHENOLIC CONTENT IN SAFFLOWER SEED OIL (CARTHAMUS TINCTORIUS L.)

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ABSTRACT

Safflower (Carthamus Tinctorius L.) is one of oilseed species which has a great place in nutritional and pharmaceutical uses mostly due to its unsaturated fatty acid content, with a predominance of linoleic acid combined with high tocopherol content. Other compounds are also present in safflower oil. Among them, phenolic compounds are responsible for its stability and its important nutritional value. The antioxidant activity of safflower was reported previously to prevent cardiovascular risks. The aim of this study was to investigate the oil quality of three safflower accessions, originating from France, Algeria and Syria, cultivated during three consecutive years (2015, 2016 and 2017) under semi-arid area in Algeria. Phenolic content and antioxidant activity of seed oil were evaluated. The results showed that these parameters varied according to both genotypes and years (p

Keywords: *total phenolic content, seed oil, Safflower, antioxidant activity.*

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L'IMPACT DU CHOIX DES MATERIAUX DE CONSTRUCTION DE L'ENVELOPPE ARCHITECTURALE SUR SA PERFORMANCE THERMIQUE : CAS DES HABITATIONS AUTO CONSTRUITES A BISKRA

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ABSTRACT

La performance climatique et énergétique de l'enveloppe architecturale des bâtiments est tributaire des choix conceptuels formels et constructifs relatifs aux éléments structurels, notamment, les murs, la toiture et les ouvertures généralement considérés comme facteurs déterminants dans les échanges thermiques entre le bâtiment et son environnement. Donc notre étude est basée sur une analyse quantitative dans le but d'évaluer les possibilités d'amélioration et d'optimisation de l'adaptabilité climatique de l'enveloppe tout en respectant les spécificités propres de l'habitat résidentiel autoproduit à Biskra. Les scénarios d'optimisation feront prévaloir des stratégies passives et porteront sur les éléments de l'enveloppe telle que (1- les ouvertures : fenètres et portes, 2- les surfaces opaques verticales : murs, 3- les surfaces opaques horizontales : toiture). En procédant à des tests de simulation thermique dynamique à l'aide du logiciel TRNSYS17, il est, d'abord, question d'étudier l'impact des caractéristiques matérielles (architecturales et constructives) de l'enveloppe sur le confort thermique des occupants sous les conditions du climat chaud et aride de Biskra, ensuite, on testera le potentiel d'amélioration du fonctionnement thermique de l'habitation autoproduite graçe à des choix adéquats portants sur les attributs architecturaux et constructifs de l'enveloppe.

Keywords: *Habitat individuel auto construit, Confort thermique, Matériaux de construction, Climat chaud et aride, Biskra.*

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EVALUATION DE LA DURABILITÉ DES BÉTONS AUTOPLAÇANTS RENFORCÉS DES FIBRES DE PALMIER DATTIER EXPOSÉS A UN MILIEU AGRESSIF

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ABSTRACT

Dans une stratégie de substitution des ressources non renouvelables par des ressources naturel, renouvelables et à faible impact économique et écologique, les composites cimentaires renforcés de fibres végétales suscitent un intérêt croissant dans le monde. Quelques chercheurs ont utilisé les fibres végétales dans les bétons autoplaçant pour améliorer leur retrait plastique et fissuration au jeune âge (24h). Par contre, les travaux concernant la durabilité des bétons autoplaçant avec fibres végétales sont limités. Dans ce travail on traite, la durabilité des bétons autoplaçant renforcés par la fibre végétale de palmier dattier (BAPF) dans un milieu sulfatique. L'altération est évaluée par le suivi de l'observation visuelle de l'état de surface des éprouvettes et la perte de poids. L'analyse chimique et l'état de dégradation sont réalisés sur les composés néoformés par des analyses aux rayons X et des observations au microscope électronique à balayage. Les différents résultats indiquent que les BAPF présente de bonnes résistances dans un milieu sulfatique.

Keywords: *milieu acide, fibre végétale, béton autoplaÃ§ant, durabilité*

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SEMI-CONDUCTEUR MAGNETIQUE DILUE A BASE DE ZNS DOPE AL, SI ET P: CALCUL AB-INITIO

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ABSTRACT

Les propriétés électroniques et magnétiques du ZnS dopé avec des éléments non-magnétiques Al (Aluminium), Si (Silicium), P (Phosphore) et Cl (Chlore) sont calculées en utilisant la théorie de la densité fonctionnelle (DFT) implémentée dans le code Wien2k. Nous avons utilisé l'approximation du gradient généralisé plus la méthode de Becke-Johnson modifiée (GGA+mBJ). Les résultats de calcul sur une supercellule (2x2x1) révèlent que le ZnS dopé avec les atomes Al, Si et P présente un comportement demi-métallique avec un moment magnétique total entier de 3,0, 2,0 et 1,0 µB respectivement. Contrairement au ZnS dopé avec Cl qui présente un caractÈre non-magnétique. Les structures de bandes électroniques obtenues pour les spins majoritaires (spin up) et minoritaires (spin down) montrent que les dopants réduisent la valeur du gap de 3.52 eV pour ZnS pur à 2.51, 2.83 et 3.35 eV pour le ZnS dopé avec Al, Si et P, respectivement. En outre, les calculs des énergies de formation des défauts montrent que le ZnS dopé avec ces trois atomes pourrait Ãªtre réalisé expérimentalement dans des conditions riches en Zn. Al, Si et P peuvent alors constituer des dopants non-magnétiques prometteurs pour la fabrication de semi-conducteurs magnétiques dilués (DMS) à base de sulfure de zinc (ZnS). .

Keywords: *métal, demi, semi conducteur magnétique dilué, mBJ, LAPW, FP, énergies de formation des défauts.*

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STUDY OF STRUCTURAL, ELECTRONIC AND ELASTIC PROPERTIES OF HALF-HEUSLER

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ABSTRACT

First-principles calculations are performed to investigate the structural, electronic, magnetic and elastic properties of the half-Hesuler alloys CoMSn (M =Ru,Y) in three phases (I, II and III phases) by using the full-potential linearized augmented plane wave (FP-LAPW) as implemented in the WIEN2k code based on the density functional theory (DFT), within the (GGA) and (GGA+ mBj). From the structural properties, we have calculated the equilibrium lattice constants, the bulk modulus and the pressure derivative of the bulk modulus and the total energy as functions of the volume for the three phases (I, II and III). We have found that all the compounds are most stable in the phase II, and have a ferromagnetic state at optimized lattice constants. Also, we have calculated the electronic properties of the two half-Heusler alloys and shown that all the compounds have metallic characters with an integer magnetic moment. The elastic constants, such as the shear modulus, Young's modulus, anisotropy factor and Poisson's ratio, have been obtained and demonstrate that the compounds are ductile, anisotropic and stiff. The obtained electronic and magnetic properties attest that these compounds can be applicable for spintronic technology.

Keywords: *electronic structure, LAPW method, Hesuler, FP, cubic ferromagnetic half, elastic properties.*

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STABILITE ET TRANSITION DE PHASE DU MONONITRURE DE TECHNETIUM

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ABSTRACT

Les nitrures et carbures de métaux de transitions ont attiré beaucoup l'attention des scientifiques graçe à leurs propriétés intéressantes, essentiellement mécaniques, thermiques , mais aussi semiconductrices et supraconductrices, ce qui fait d'eux d'excellents candidats pour des applications variées, tels que des conducteurs durs, et jouent un rôle majeur dans la médecine nucléaire. Le Technétium est un déchet radioactif néfaste déversé dans la nature avec un taux élevé, forçant les chercheurs Ã trouver une phase stable aux matériaux riches en Tc. La question qui revient souvent est la potentielle fabrication de tels composés afin d'exploiter les propriétés variées mentionnées plus haut, la plus connue étant la super-dureté, fournissant d'intéressantes applications dans les revÃªtements anti-usure, ou de remédier aux inconvénients des déchets nucléaires. Expérimentalement parlant, la littérature démontre une possible synthÈse du nitrure de Technétium, oÃ¹ le matériau cristallise dans la structure cubique à faces centrées à 900-1100°C. Dans notre travail, nous examinons Ã l'aide du code de calcul WIEN2K [25], basé sur une formulation full-potential linear augmented plane-wave (FP-LAPW), utilisant l'approximation du gradient généralisé (GGA), le mononitrure de Technitium (TcN) dans sept structures cristallines types binaires, CsCl, NaCl, WC, NiAs, WU, ZnS et NbO. Cette derniÈre se trouve être énergiquement la plus stable. Afin d'examiner la possible fabrication du mononitrure de Technétium dans cette phase, une étude dynamyque de phonons a été effectuée à l'aide du code Quantum ESPRESSO-PWscf (Plane-Wave Self-Consistent Field). La courbe montre des fréquences positives, attestant de la stabilité du composé. Cette stabilité a été confirmée par une étude des constantes élastiques. De plus, une transition de phase vers la structure NiAs, à une pression de 17,1 GPa a été démontrée par l'évolution de l'enthalpie en fonction de la pression.

Keywords: *Transition de Phase, Energie de Cohésion, Phonons, Phase stable, Code de calcul*

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MATERIALS FOR RAILWAY BALLAST, EXPERIMENTAL STUDY OF LIMESTONE AND BASALT FROM SENEGALESE QUARRIES

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ABSTRACT

This paper focuses on an experimental work of characterization of aggregates come from Senegalese quarries. These are Bandia Limestone (Sindia, Thiès Region) and Diack Basalt (Ngoundiane, Thiès Region). The materials are designed for use as railway ballast, the grain size studied is 25/50 mm. The experimental study is divided into two main parts: Proctor tests with C-Mould of standard NF EN 13286-2 to study compaction behaviour, a physico-mechanical characterization to determine the hardness characteristics of the aggregates in question. With Î³dmax = 2.142 g/cm3 and WOPM = 5.3%, the compaction results clearly show the poor behaviour of the limestone under the effect of repeated loads and water. The compaction references that characterize Diack Basalt are: Î³dmax = 2.15 g/cm3 and WOPM = 0.37%. Diack Basalt's compaction behaviour shows good performance. Results show that Limestone from the Bandia quarries does not have the characteristics required to be used as ballast with a hardness of 0.85. The hardness of Basalt from the Diack quarries is 17.11. The Diack Basalt gives also good physical and mechanical characteristics for use as railway ballast (cleanliness, absorption, density, Deval and Los Angeles).

Keywords: *Sénégal, Ballast, Hardness, UIC, Proctor*

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VALORIZATION OF LIGNOCELLULOSIC WASTE FOR THE PREPARATION OF NEW POLYMER MATERIALS

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ABSTRACT

In order to limit the use of fossil fuels and to recover lignocellulosic waste, natural fiber composites are part of a favorable context that will make it possible to respond to environmental, economic and social challenges thanks to their low cost, low density properties. , renewable and biodegradable. The aim of this study is to develop a new material consisting of a thermoplastic matrix (PVC) reinforced with natural fibers based on date cores. In this context, different formulations based on polyvinyl chloride / flour dates kernels were prepared with different loading rates ranging from 10 to 40%. The materials developed have been characterized by various analytical techniques, namely: mechanical, morphological and structural tests. The recorded results indicate good mechanical properties, which are influenced by the increase in the charge rate. Therefore, these materials can be used in several fields, particularly for automobiles and packaging.

Keywords: *date kernel flour, polyvinyl chloride, Composite materials, properties.*

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EVALUATION OF CATHODIC PROTECTION OF API 5L X52 STEEL

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ABSTRACT

Underground metal structures such as pipelines and storage tanks are subject to corrosion in contact with the ground. In order to maintain the integrity of the structures, double protection is often used: a protective coating and cathodic protection by impressed current. This study aims to evaluate the protection of carbon steel X52 by applying different cathodic potentials in a simulated soil solution (NS4) of pH 8 at room temperature with different electrochemical techniques such as chronoamperometry, electrochemical impedance spectroscopy (EIS), potentiodynamic polarization and microscopic surface observations. It has been shown that when cathodic overvoltage increases the corrosion rate increases. Â Â Â

Keywords: *NS4 solution, API 5L X52 steel, cathodic protection, potentiodynamic polarization.*

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TRANSFORMATION MARTENSITIQUE DE L'ALLIAGE QUATERNAIRES DE TYPE HEUSLER CO2XAS(X=TI, FE).

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ABSTRACT

Dans ce travail nous avons étudié les propriétés électroniques et magnétiques des alliages Full-Heusler Co2TiAs et Co2FeAs. Nous utilisons l'approximation du gradient généralisée GGA implémenté dans le code de calcul Wien2k. Une transition de phase s'opère sous l'influence d'une contrainte uniaxiale allant de la phase cubique vers la phase la plus stable tetragonale (Groupe d'espace I4/mmm), dite phase Martensitique. Les paramètres structuraux et électroniques sont évalués pour les deux phases. Deux extrémums minimums de la phase la plus stable apparaissent à c/a=1,30 et 1,17 pour Co2TiAs et Co2FeAs, respectivement. Pour confirmer la stabilité de cette dernière, la densité d'états (DOS) de ces matériaux ont été calculés.

Keywords: *Transformation martensitique, Heusler, Full, DFT, DOS.*

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FIRST-PRINCIPLES CALCULATIONS OF STRUCTURAL, ELASTIC, ELECTRONIC AND MAGNETIC PROPERTIES OF TERNARY HEUSLER ALLOYS CU2MNZ (Z = GE, GA)

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ABSTRACT

We have studied the structural, elastic, electronic and magnetic properties of the ternary Heusler alloys Cu2MnZ (Z = Ge, Ga) using the full-potential linearized augmented plane wave (FP-LAPW) method based on density functional theory (DFT) as implemented in WIEN2k code. In this approach, the generalized gradient approximation (GGA) within the Perdew-Burke-Ernzerhof parameterization (PBE) is used to describe the exchange-correlation potential. It is shown that the calculated lattice parameters, elastic constants and spin magnetic moments are in good agreement with the available theoretical and experimental data. We have also found that the Heusler alloys Cu2MnGe and Cu2MnGa exhibit a ferromagnet metallic character. Furthermore, the calculated elastic constants show that Cu2MnGe does not reflect the mechanical stability criteria, while Cu2MnGa alloy is elastically stable in Fm-3m space group. Further, The elastic moduli for polycristalline materials such as Shear and Young's moduli, isotropy factor, Cauchy's Pressure and Poisson's ratio have been also calculated and indicated that the Cu2MnZ compounds are anisotropic and ductile in nature

Keywords: *metal, LAPW method, First, principles investigation, FP, elastic and magnetic properties, electronic structure, Heusler compounds, ferromagnetic*

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THE NON-ISOTHERMAL KINETICS OF HYDROXYAPATITE FORMATION IN KAOLIN - NATURAL PHOSPHATE MIXTURES

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ABSTRACT

In this work, we studied the kinetics of hydroxyapatite formation in different composites under non-isothermal conditions using DTA. Different composites based of anorthite, hydroxyapatite, Î²-TCP and mullite were prepared by reaction sintering of Kaolin DD2 and Natural Phosphate NP. Seven compositions were prepared and studied, while varying the percentage of the kaolin from 20 to 80 wt. % at 10% increments. The DTA conducted at heating rates of 10, 20 and 30 °C min-1 showed an exothermic peak in all composites in the region 700-750 °C associated with hydroxyapatite formation. The activation energies measured from non-isothermal treatments for seven compositions 20, 30, 40, 50, 60, 70 and 80 mass% of kaolin were 194, 178, 178, 209, 162, 146 and 121 kJ mol-1, respectively. The n values Avrami parameter for all compositions are larger than 2.5, the hydroxyapatite crystallization of these composites is followed by three-dimensional growth.

Keywords: *Natural phosphate, Kaolin (DD2), sintering, Reaction, Hydroxyapatite, Activation energy, Composites.*

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CARACTERISATION DES MATERIAUX CIMENTAIRES A BASE DU CHARBON ACTIF

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ABSTRACT

En plus des additions minérales, il existe d'autre ajouts comme les matériaux organiques qui peuvent jouer le rôle d'additions dans le béton tel que les charbons actifs, qui sont considérés comme des très bons dépolluants avec une meilleure capacité d'adsorption des gaz nocifs. Des études ont montrés qu'en ajoutant une petite quantité (0,5%) de charbon actif à la pâte cimentaire, le béton peut être décontaminé en améliorant et en prolongeant sa capacité d'adsorber les gaz nocifs (tel que le NOX et les COVs). Cette capacité d'adsorption élevé (prés de 20 à 25% de plus que le béton ordinaire) est liée à la porosité et la surface spécifique élevé du charbon actif. Horgnies et al ont montrés dans leur travaux de recherche que l'addition d'une petite quantité de charbon actif (jusqu'à 2% de substituion en ciment) n'influe pas considérablement sur la fluidité, la porosité et la résistance mécanique du béton. L'objectif de notre étude est la valorisation du charbon comme addition organique dans les matériaux cimentaires (pâte et mortier) et d'étudier son influence sur la fluidité, la prise, la porosité et la microstructure de la matrice cimentaire. Les résultats de cette étude ont montrés que le charbon actif étudié est adsorbant aux gaz (dioxyde d'azote) et son introduction dans la matrice cimentaire retarde la prise à partir de 2% de substitution en ciment sans influera la fluidité de la pâte cimentaire.

Keywords: *MEB, adsorption, Charbon actif, porosité, la prise.*

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STUDY OF PHONONIC AND ELASTIC PROPERTIES OF XALN (X=CR, Y): APPLICATION TO SURFACE ACOUSTIC WAVE SENSORS

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ABSTRACT

The phononic and elastic properties of Cr(Y)-doped aluminum nitride thin films were investigated by means of first-principles calculations based on the density functional theory within generalized gradient approximation (GGA) and local density approximation (LDA) methods. In addition, the present study describes the computational modeling, simulation and optimization of surface acoustic wave (SAW) device based on XAlN (X=Cr, Y). The frequency response, Radiation conductance and Acoustic susceptance of the SAW delay line based on XAlN (X=Cr, Y) piezoelectric thin film were evaluated using COM model. We report the remarkable improvement of Cr-AlNSAW and Y-AlNSAW sensors proprieties compared to un-doped AlNSAW.

Keywords: *aluminum nitride, COM model, SAW device, DFT calculation*

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THE COMPRESSION MECHANICAL PROPERTIES EVALUATION OF LOCAL CORK

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ABSTRACT

As a lightweight, compressible, thermal and sound insulating material, chemically stable and durable, cork has been used for a long time to meet a wide variety of applications. The present work is focused on a valorization of the mechanical properties of the local cork starting from a sampling taken on the cork oaks in the Jijel cork oak trees. To do this, simple compression tests were conducted in the radial and non-radial directions in order to highlight its orthotropic nature. Cork shows stress-strain curves, typical of cellular materials, characterized by an elastic slope followed by an important plateau corresponding to buckling of the cells. The elastic parameters including the Young's modulus and the elastic limit are identified from the stress-strain curves. The results obtained show that the radial direction is the most resistant compared to the other two almost identical directions. The density has a significant influence on the mechanical properties of cork, especially its rigidity, which increases in the densest samples.

Keywords: *Orthotropic, Elastic, Cork, Compression*

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FINITE ELEMENT EVALUATION OF SIFS IN FGMS USING GENERALIZED DISPLACEMENT CORRELATION METHOD

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ABSTRACT

In this paper a versatile and easy to use approximate procedure was used for the estimation of mode I stress intensity factors is the generalized displacement correlation method (GDC) uses a finite element-based calculation code in our work.The conducted analysis showed that approximate method (the GDC method) is, above all, fast and efficient tool in functionally graded materials (FGMs) materials under thermal as well as mechanical loads. We find that the proposed method using quadratic elements is accurate for mode-I fracturing. Including for very coarse meshes.This paper presents various numerical examples, the comparison between results also showed the significance of accurate calculation of stress intensity factors, in order to provide a better understanding and prediction of cracks propagation.

Keywords: *Stress intensity factor, Generalized displacement correlation, Functionally graded materials, Thermal loads, Fracture mechanics.*

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ETUDE DE LA RÉPONSE MÉCANIQUE DES PLAQUES SANDWICH SYMÉTRIQUE ET ANTISYMÉTRIQUE EN FGM

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ABSTRACT

Une nouvelle théorie de la déformation de cisaillement d'ordre élevée (HSDT) est présentée pour étudier le comportement du flambement mécanique des plaques sandwich (FG) fonctionnellement graduées. La HSDT conventionnel est modifié en considérant quelques suppositions de simplification pour que le nombre d'inconnus soit réduit. L'utilisation du terme intégral dans la cinématique de la plaque a mené Ã une réduction du nombre d'inconnus et d'équations régissante. Tout en respectant les conditions aux limites sur les surfaces supérieure et inférieure de la plaque sans l'utilisation de facteur de correction de cisaillement. Les caractéristiques matérielles de la plaque sandwich sont considérés graduées dans la direction d'épaisseur selon une distribution simple de loi de puissance en termes de fractions de volume des constituants. Un principe de variation basé sur l'énergie est utilisé pour dériver les équations régissantes comme problÈme de valeur propre. Les équations régissantes sont résolues analytiquement pour une plaque sandwich Fonctionnellement graduée avec diverses conditions aux limites soumise aux différents types de chargement mécanique. La validation du présent travail est effectuée avec les résultats disponibles dans la littérature. Des résultats numériques sont présentés pour démontrer les influences des variations de l'indice de fraction de volume, du rapport de longueur-épaisseur, du type de chargement et de l'épaisseur des couches fonctionnellement graduée sur les charges du flambement mécanique non dimensionnelles.

Keywords: *Modélisation Analytique, Flambement Mécanique, Matériaux FGM*

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THERMAL BEHAVIOR DURING WATER ADSORPTION/DESORPTION ON LTA ZEOLITE/DIATOMITE ADSORBENTS

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ABSTRACT

Porous aluminosilicate and silica-based materials are widely used in several industrial chemical processes such as adsorption, ion exchange and catalysis. In biomedical application, microporous zeolite, clay minerals and silica materials such as LTA zeolite, kaolin and diatomaceous earth respectively are expected to have a great potential for hemostatic applications due to their favorable chemical and physical stability, non-biological toxicity and high water absorption capacity. LTA zeolite based adsorbent can absorb large amounts of water molecules within their pores, enhance the coagulation factors in hemorrhaging blood and induce rapid hemostasis. In spite of success of LTA zeolite to promote the coagulation of blood, the main problem is the exothermic process during interaction of the zeolitic powder with blood, which generates excessive heat, leading to tissue damages. The control of severe bleeding can be addressed by altering zeolite properties using pre-hydration, ion exchange with cations of low hydration energy or adding some clay minerals or silica materials such as kaolinite, bentonite or diatomaceous earth to the adsorbents. The aim of this study is to evaluate the adsorption/desorption properties of hydrated zeolite-diatomite adsorbents by using thermogravimetric and derivative thermogravimetry (TG-DTG) analyses. The effect of diatomite loading, thermal effects during water desorption and the type of the water molecule interactions with cationic species of adsorbents are discussed.

Keywords: *hemostatic agent., diatomite, zeolite, Water adsorption*

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ELIMINATION OF MALACHITE GREEN ON GRANULAR ACTIVATED CARBON PREPARED FROM OLIVE STONES IN DISCONTINUOUS AND CONTINUOUS MODES

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ABSTRACT

The objective of this study is the removal of a anionic dye (Malachite Green) by granular activated carbon based on olive stones in discontinuous and continuous processes. For the batch process, the parametric study of the adsorption of Malachit Green on granular activated carbon at room temperature, has enabled us to highlight the dependence of the efficiency of this adsorbent on the various operating parameters (pH, initial concentration and mass of adsorbent). The Langmuir model has described from the adsorption isotherm of malachite green on studied GAC. The improvement of the performance of the fixed bed adsorption column requires that the breakthrough curves can be predicted according to the various system parameters (height, flow velocity and concentration of the pollutant). Experimental data were correlated with different mathematical models such as Bohart - Adams, BDST, Thomson, and Yoon - Nelson. All models used for both GAC have been used successfully to describe the breakthrough curves of the dye.

Keywords: *Olive stone., Activated carbon, Modeling, Adsorption column, Fixed bed*

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CEMENTITIOUS MATERIAL BASED ON NANOCOMPOSITE COPOLYMER

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ABSTRACT

Polymer materials of amphiphilic biodegradable (PCL-PEG-PCL) triblock have been successfully prepared by the ring opening polymerization of ε -caprolactone (CL) in the presence of poly (ethylene glycol) (PEG) at 140°C employing Maghnite-TBHSA (MaghniteNa + treat with tetra amonium hydrogen sulphate), a non-toxic Montmorillonite clay as catalyst. We conducted this study on the synthesis of poly (ε -caprolactone) -pol (ethylene glycol) - poly (ε-caprolactone) / montmorillonite nanocomposites. Our aim was not only to improve the properties of a polymer by incorporating a lamellar silicate, but we sought to develop a direct method for the incorporation of Maghnite in the polymer by the direct application of the latter to the catalysis of the reaction of the polymerization in situ of the monomer. The nanocomposiste copolymer was characterized by DRX spectra, GPC and DSC analyses. Amphiphilic block copolymers with hydrophilic and hydrophobic blocks have attracted much attention in recent years. The hydrophobic blocks in an aqueous phase undergo macromolecular assembly to generate polymeric micelles and micelle-like aggregates. Thus, they have particular potential for biomedical use in drug delivery, tissue regeneration, environmentally responsive biomaterials, and other areas. In order to understand the influence of the nanocomposite copolymer on the mechanical behavior of cementitious materials, an experimental study was carried out on a standardized copolymer nanocomposite-substituted mortar, of which we carried out mechanical tests. These tests were defined in order to understand their damage. The results offer a better understanding of the influence of poly (ε -caprolactone) -pol (ethylene glycol) - poly (ε-caprolactone) / montmorillonite TBHSA on the mechanical properties and durability of the Mortar-Copolymer composites, from which the nanocomposite copolymer gives better results, and make it possible to highlight thebeneficialeffect, the durability of such an addition and confirm the effects of the property of the nanocomposite copolymer.

Keywords: *Mortar, Nanocomposite, Copolymer, montmorillonite, Biodegradable*

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CARBONATATION DU BÉTON DES RÉSEAUX D'ASSAINISSEMENT

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ABSTRACT

Plusieurs dégradations ont été constatées sur les réseaux d'assainissements (conduites et regards) dans la région d'Ouargla, à cause de la qualité du béton produit, le type de conduites utilisées, et aussi l'agressivité de l'environnement extérieur. Parmi ces problèmes, on peut citer la carbonatation du béton ou la diffusion de gaz carbonique (CO2) à l'intérieur des pores du béton armé des ouvrages d'assainissement. Dans cette étude nous avons confectionné des éprouvettes en béton de ciment CRS, ces échantillons ont été conservés dans le milieu réel (eau usée et gaz carbonique), et dont les résultats ont été comparés à ceux des éprouvettes témoins. Nous avons conclu que le béton de ciment CRS est de faible durabilité dans les réseaux d'assainissement, et se dégrade rapidement sous l'effet du gaz carbonique. Enfin pour les éprouvettes exposées au gaz carbonique nous enregistrons une régression d'eviron 40 % de résistance à la compression et aussi une profondeur de carbonatation qui est de l'ordre de 8 mm à l'âge de 365 jours.

Keywords: *gaz carbonique (CO2)., eau usée, ciment résistants aux sulfates (CRS), Durabilité*

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THERMO-MECHANICAL AND MORPHOLOGICAL PROPERTIES OF PERLITE REINFORCED UNSATURATED POLYESTER MATERIALS COMPOSITES

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ABSTRACT

The perlite has been used as reinforcing filler for unsaturated polyester resin (UPR) in order to obtain UPR/perlite materials composites. Different loadings of perlite (1 to 5 phr - parts per hundred parts of resin) of different dimension (up to 50 µm and less than 50Âµm) were added to the UPR. The mechanical properties of the UPR/perlite composites increased up to 4 phr perlite loading, because of the high affinity between the UPR and the perlite surface and the good dispersion of the filler into the matrix. However, higher perlite loading caused a decrease in the mechanical properties of the composites because of the agglomeration of the fillers. Moreover, higher degree of crosslinking was reached. DSC thermograms showed that the exothermic peak is displaced to higher temperatures which suggest that the perlite caused a delay in the post-cure reaction. TGA thermograms indicated that the incorporation of perlite improves the thermal stability of UPR.

Keywords: *Unsaturated polyester resin, perlite, materials composites, mechanical properties, thermal analysis.*

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EFFECTIVENESS OF FRP HYBRID COMPOSITES FOR THE STRENGTHENING CONCRETE BEAMS

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ABSTRACT

This research is a contribution to work on strengthening and repair of reinforced concrete structures, its presents an experimental investigation of reinforced concrete beams strengthening by means of different combinations of externally bonded hybrid fabrics-reinforced polymer composite: Carbon and glass fabric- reinforced polymer composite and another fabric-reinforced polymer composite based on vegetable fiber it is the jute fiber. For this purpose, two kinds of beams have been considered: a control beam and beams strengthened in flexure with fiber-reinforced polymers and vegetable composites.Â The series of the beams were subjected to three point loading test until failure. The principal objective of this study is the conjugation of the properties of each type of fiber fabric to increase the load capacity, rigidity, and ductility of reinforced concrete beams and obtaining a typical model of reinforcement beams, which provides both these three desired mechanical properties. The structural performance of the sixteen beam specimens will be discussed on the following two aspects: flexural ductility improvement; and Failure load. The obtained results indicated an increase in load carrying capacity of beams strengthened due to the presence of fiber-reinforced polymer and vegetable composites, the FRP-concrete beams behave in a more ductile manner when compared with the reinforced concrete beams. -The typical compensation study which provides for system of reinforcement beams with three layers of vegetable composites, it can compensate the beam reinforced by one layer of carbon fiber.

Keywords: *failure load, ductility, composite, FRP Hybrid, Beam*

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STATIC ANALYSIS OF PLATES COMPOSITES BY A SIMPLE THEORY QUASI 3-D

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ABSTRACT

This work presents a static analysis of laminated composites plates by employing a novel higher-order shear deformation theory with stretching effect (quasi-3D HSDT) by a sinusoidal variation of all displacements through the thickness and satisfies the stress-free boundary conditions on the top and bottom surfaces of the plate without using shear correction factor. The displacement field of the proposed theory has only five unknowns, which is even less than the other shear and normal deformation theories. The principle of virtual works is used to derive the governing equations and boundary conditions. The closed form solutions are obtained by using Navier procedure for cross-ply laminated composite plates subjected to sinusoidal load for simply supported boundary conditions. The numerical results are compared with those predicted by other theories to show the effects of shear deformation and thickness stretching on displacement and stresses.

Keywords: *Static analysis, Shear deformation theory, Stretching effects, Laminated composite plates*

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COMPORTEMENT RHEOLOGIQUE D'UN MORTIER AUTOPLAÇANT A BASE D'UN CIMENT LC3

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ABSTRACT

L'utilisation des bétons autoplaçants constituent l'une des plus importantes avancées de ces dernières décennies dans le domaine de construction. Malgré l'avancé des recherches en termes d'adjuvants réducteurs d'eau, qui assurent l'optimisation de la fluidité désirée de ce type de béton, il n'est en tout cas possible d'obtenir cette fluidité sans faute de stabilité à l'état frais, qu'en utilisant une grande quantité de liant, notamment le ciment portland, dont la fabrication contribue de façon importante aux émissions de CO2. L'objectif de notre travail s'intéresse d'une part à optimiser un nouveau type de ciment « Limestone Clacined Clay Cement » (LC3) à base de matériaux locaux et d'autre part à étudier le comportement rhéologique des mortiers autoplaçants (MAP) obtenus à base de ce ciment, à l'aide d'un agitateur (Heidolph-RZR 2102 Control Z) et de l'application Rheograph (développée récemment) en utilisant les modèles rhéologiques de Robetson stiff ; Herschel-Bulkley et Bingham avec l'application du logiciel d'analyse statistique JMP7.

Keywords: *Mortiers autoplaçants, ciment LC3, formulation, rhéologie, seuil de cisaillement, viscosité plastique, poudre de marbre, Argile calcinée, plan d'expérience*

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NUMERICAL STUDY OF COMPOSITE HELICOPTER BLADE

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ABSTRACT

In this paper, a coupled damage effect in the stability of a composite helicopter rotor blade is presented, under dynamic loading response in the stationary analysis condition. The analysis of the stress which operates the rotor blade is done. Calculations of different energies and the virtual work of the aerodynamic loads from the rotor blade are developed. The use of the composite material for the rotor offers a good result, to avoid resonance phenomena, especiallythe flapping resonance that can appear between them on the helicopter blades. To the first study of dynamic behavior of system rotor with the different modes of vibration and evaluation of blades is established. Secondly, a nonlinear model identifying the aeroelastic constraints as a function of the rigidity of the fuselage is simulated. Numerical calculations on the model developed prove that the damage effect has a negative effect on the stability of the blade.The study of the composite blade in transient system allowed determining the stress distribution due to various excitations.

Keywords: *vibtation, fracture, fatigue, composite blade, numerical.*

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IDENTIFICATION OF DEFECTS AND FATIGUE OF ALUMINUM PLATES BY CONTROL OF VIBRATION CHARACTERISTICS

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ABSTRACT

The Aluminum plates are among the most commonly used structural elements. The use of more and more important, shows the imperative need of the study of their vibratory behavior and thus becomes of great importance and helps the engineers to design better structures. Vibration analysis is an important current topic, both from an academic and an industrial point of view. The latter affects many areas, such as space technology, naval and civil engineering, automotive, aeronautics, and bridges, buildings, or nuclear engineering. Controlling vibrations in an aluminum plate is a thorny issue that is often a problem for the researcher and the engineer. To ensure this control, the determination of the dynamic characteristics of the plates is essential. The fundamental objective of this work is to study the dynamic behavior of aluminum isotropic rectangular plates through the use of ABAQUS to predict plate characteristics in both static and dynamic states. An experimental study is carried out on the apparatus of free vibrations TM 155 to study the vibratory behavior of the plates of aluminum and consequently to predict the levels of energy of vibration as a function of the frequency. Knowledge about the maximum deformation energy level frequency of the plate will be useful for protecting and increasing the life of the plate.

Keywords: *frequency., fatigue, Aluminum plate, aircraft*

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SECONDARY DEVELOPMENT BY ABAQUS USING PYTHON AND THE APPLICATION OF THE SIMPLEX ALGORITHM FOR THE IDENTIFICATION OF CRACKS IN AERONAUTICAL STRUCTURES

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ABSTRACT

A new computational tool is developed for the precise detection and identification of cracks in aeronautical structures, to be used in conjunction with non-destructive testing of specimens. It is based on the solution of an inverse problem. On the basis of certain measurements, the aim is to estimate whether the structure contains a crack and, if necessary, to find the parameters (location, size, orientation and shape) of the crack that produces the closest displacement of the data. measured in a chosen standard. The inverse problem is solved using a simplex algorithm. The simplex optimization process requires the solution of a very large number of problems. These are solved via the Extended Finite Element Method (XFEM). This makes it possible to use the same regular mesh for all the problems. The performance of the method is demonstrated by a number of numerical examples involving a cracked object. Various aspects of calculating the method are discussed, including the a priori estimation of the bad posture of the crack identification problem.

Keywords: *extended finite element methods, inverse problem, Identification of cracks, optimization.*

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FATIGUE AND FRACTURE DAMAGE MECHANISMS OF COMPOSITE AIRCRAFT

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ABSTRACT

In this work,we studied fatigue fracture and crack in composite aircraf,in wich we studied airfoil NACA 2412 made of glass fiber.first,in the experimental part experiments were carried out on two laminate plate (carbon/ glass) with 8 plies, the first one controlled by ultrasonic method non destructive testing techniques (NDT) to detect cracks and also determine the mechanical characterization,and other traction experience on both plates then get the results,secondly,the simulation of airfoil NACA 2412 allow as to deduce displacement,deformation,stress and strain,seven modes shapes and natural frequencies.The principal results founded after simulation,the principal results founded after simulation,the composite materials have attractive aspects like the relatively high compressive strength,good adaptability in fabricating thick composite shells,lowweight,low density and corrosion resistance.From this study the CFRP and GFRP are best materials use in aircraft parts.The frequencies increase proportionally with each mode.

Keywords: *ultrasonic, NDT, fracture, fatigue, composite aircraft, traction.*

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ETUDE ET PREDIRE DE LA RUPTURE MECANIQUE DE COMPOSITES STRATIFIEES

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ABSTRACT

Ce travail est destiné pour étudier le comportement de matériaux composites stratifiés en fonction des directions de chargement et prévoir de la rupture en premier temps, et simuler le phénomène en utilisant les différentes méthodes numérique, à la ruine du premier pli, le critère de la rupture est utilisé avec différents modèles pour représenter la dégradation de propriétés mécanique des plis endommagés, en fonction de la nature du pli. La méthode de réduction couche par couche avec un modèle de réduction de la rigidité a été utilisée dans la prévision. Les ruptures d'un certain nombre de stratifiés composites ont été prédites. Les enveloppes de rupture des composites unidirectionnels et des stratifiés composites multicouches ont été prédites par la théorie des plaques stratifiées linéaires ainsi que par le critère de rupture de lamelle de Hashin-Rotem et une méthode de réduction par pli par couche avec un modèle de réduction de rigidité parallèle. La non-linéarité des matériaux a été modélisée par le modèle de plasticité à un paramètre pour les composites à fibres. La fissuration progressive de la matrice et la réduction de la rigidité résultante ont été prédites à l'aide d'une analyse simplifiée du décalage au cisaillement et de l'analyse par éléments finis.

Keywords: *couche par couche, stratifiées, Rupture prédiction, méthode numérique*

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STUDY OF THE FATIGUE BEHAVIOR OF SUPER HEATER AND RE HEATER

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ABSTRACT

In this work, we studied the fracture of the fatigue and the crack in the boiler tubes super-heaters and re-heaters. Boiler or steam generator plays a vital role in power plant for electricity generations, inside the boiler, there are tubes that transport the steam to the turbine so it's play the main role in the boiler they are the super-heater and the re-heater, in this study we define damage and fracture of super-heater and re-heater. In the experimental part, We carried out four techniques of non-destructive control on a model of super-heater, we started by the ultrasound (CT-GAGE DL +) to detect cracks and also to determine the mechanical characteristics, then the penetration test to detect defects, finally the magnetic particle test (the magnetoscopy), to detect the slightly underlying defects. In the simulation of super-heater deduce displacement, deformation, stresses and strain, 7 modes shapes, and natural frequencies.

Keywords: *boiler tube failure., damage, fatigue, heater, re, heater, super, boiler tubes*

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INTEGRATION OF CONSTRAINTS RELATED TO COMPOSITE MATERIALS IN THE DESIGN OF INDUSTRIAL PRODUCTS

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ABSTRACT

Manufacturing methods for products and structures made of composite materials reduce the number of parts and integrate technical functions, this advantage of composite materials leads to a lot of innovation but also to a reduction of costs and a gain in quality. A material has attributes: its density, it's resistance, it's cost, it's resistance to corrosion. For the design of a product a certain profile of these attributes is required: low density, resistance removed, low cost. The problem is then to identify this attribute profile and to compare it with those of the materials, in order to find the one that comes closest. The aim of this work is to demonstrate the feasibility of characterizing a mini turbine made of 3D printed fiber-filled composite material by the process of additive manufacturing, then compare the performance of the alloy turbine with the composite turbine according the results of the simulation by abaqus software.

Keywords: *Design, Composite Materials, Additive Manufacturing, 3D printer, Turbine.*

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INFLUENCES DE LA PROPAGATION D'UNE FISSURE SUR LES FREQUENCES MODALES DES AUBES DE LA TURBINE

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ABSTRACT

L'objectif de ce travail est de présenter un modèle d'aube de turbine Haute Pression, constituée de superalliage monocristallin à base de Nickel. Leur bord d'attaque peut constituer des sites privilégiés d'endommagement et d'amorçage de fissures qu'il est indispensable de prendre en compte dans le dimensionnement des aubes de turbines. Ce travail a consisté, dans un premier temps à faire une étude théorique, l'aube de turbine est modélisée comme une poutre de Timoshenko en rotation, un modèle de croissance d'endommagements pour des cycles de fatigue est développé en utilisant une approche de la mécanique continue de l'endommagement. Ce dernier est intégré avec le modèle de l'aube. On a fait une approche numérique pour étudier l'effet de la croissance de l'endommagement sur les fréquences tournantes, et l'effet du nombre de cycle sur la rigidité. Dans un deuxième temps une simulation numérique de la propagation de la fissure et l'influence des vibrations sur l'aube est présentée. Enfin une expérience de l'amorçage et de la micro-propagation d'une fissure est réalisée. Ce qui a permis de mettre en évidence l'endommagement mécanique et la détermination de la durée de vie prédictive de l'aube.

Keywords: *Aube, Vibration, Endommagement, Fissure, Durée de vie.*

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CORROSION INHIBITION PERFORMANCE OF 2-(1, 3- DITHIAN-2-YLIDENE) CYCLOHEXANE-1, 3-DIONE FOR STAINLESS STEEL IN 1 M HYDROCHLORIC ACID SOLUTION

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ABSTRACT

Ketene dithioacetal derivative, namely 2-(1,3- dithian-2-ylidene) cyclohexane-1,3-dione (DYCD) was synthesized and its inhibition efficiency on stainless steel corrosion in 1 M HCl solution was studied using weight loss measurements, potentiodynamic polarization, electrochemical impedance spectroscopy (EIS) and scanning electron microscopy (SEM). The results of weight loss measurements indicated that DYCD acts as good corrosion inhibitor for stainless steel in 1 M HCl and the inhibitory efficacy increases with the increase in the concentration of DYCD. Potentiodynamic polarization studies showed that DYCD is classified as the mixed type corrosion inhibitor. The inhibitive action is due to an adsorption of inhibitor molecules onto the metal surface and the adsorption of this compound followed the Langmuir isotherm. The impedance spectra (Nyquist plots) are composed of a capacitive loop at high frequencies and an inductive loop at base frequencies. The high frequency capacitive loop is related to the charge transfer process during corrosion and the resultant double layer behavior, the inductive loop is attributed to the process of relaxation of spaces adsorbed to the interface liquid / steel. The surface analysis technique (SEM) confirmed the existence of protective inhibitor film on a metal surface.

Keywords: *stainless steel, corrosion inhibition, HCl.*

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MAINTENANCE DE L'AXE PORTE D'OUILLE D'UNE GELULEUSE DE L'INDUSTRIE PHARMACEUTIQUE

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ABSTRACT

Dans ce projet de fin d'étude, on à atteindre on a réussi à développer les déférentescaractéristiques de la machine et sa maintenance qui permet le bon fonctionnement etune continuité de production de la machine. Les différents contrôles non destructifs dontnous avons développé ont permis de déterminer les défauts de l'axe porte d'ouille de lamachine. A la fin une simulation numérique pour localiser la zone critique et la valeurde la contrainte maximal de l'axe..

Keywords: *Axe porte d'ouille, Fissure, ContrÃ´le non destructif, conception*

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Topic 3: Renewable Energy, Development Sustainable, Recycling and Environment

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Tabledes Matières

BIOSURFACTANTS PRODUCTION FROM NEWLY ISOLATED ASPERGILLUS SP. FS11 USING AGRO-INDUSTRIAL WASTES

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ABSTRACT

The aim of this work is the isolation, identification, production, characterization and properties of biosurfactants producing fungal strains. The fungal strain FS11 was isolated from soil contaminated with hydrocarbons collected in southern Algeria and identified as Aspergillus sp. FS11. In an attempt to provide cost-effective carbon source for biosurfactants production, crude olive mill wastewater (OMW) was used as fermentative medium under conditions of pH 6.0, 25 °C and 8 days of incubation with 120 rpm agitation. The emulsification index values E24 reached 76 % and ST reduction from 72 to 42 ± 0.20 mN/m. TLC and FTIR analysis of the crude extract, showed that crude biosurfactant was partially characterized as glypolipopotein complex. The crude biosurfactant presented interesting properties such us; significant reduction in surface tension , important emulsifying activity and stability over a wide range of pH (2 to 12), temperature (4-100 °C) and salinity (1-10%). More interestingly, the produced biosurfactants, have proved great potential application in remobilization of the hydrocarbons from polluted soils with removal rate greater than 50%, and also it has shown an interesting antimicrobial activity against pathogenic microorganisms.

Keywords: *crude OMW, Aspergillus sp. FS11, Biosurfactants, TS, E24.*

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EFFICIENCY EVALUATION OF ANTI-CORROSION TREATMENT BY EXTRACTS OF RED ALGAE COLLECTED FROM MEDITERRANEAN COASTS

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ABSTRACT

Biomolecules extracted from red seaweed have been the subject of several studies in various fields such as the food industry and the pharmaceutical industry, but the assessment of their effectiveness against biocorrosion in the petroleum industry is the first initiative of our research project. The first objective of this study is to obtain an extract by ethanol extraction method; (Extracts A, B and C) from three red algae species harvested in the Zemmouri el Bahri and Dellys regions of Boumerdes on the eastern Algerian coast in Mediterranean waters. This work was carried out at Sonatrach laboratory to evaluate the efficiency of red algae extracts on biocorrosion. Our second objective was based on the identification of physico-chemicals characteristics of the extracts (A, B and C) and thus reveal their inhibitory and / or bactericidal power in bacterial corrosion on injection water contaminated with Sulfato-reducing Bacteria (SRB) on carbon steel by different electrochemical analysis techniques (OCP, LRP and EIS). Biological test of all extracts extracted from red algae gives a concentration ranging from 0 to 10 germs/ml on contaminated water by sulfato-reducing bacteria during 28 days of incubation at 37°C. The efficiency test of extract obtained from Gymnogongrus crenulatus gives a protective capacity of 99.69 % at 5 ppm. The infrared spectrum of the three extracts obtained from red algae confirms the presence of amine derivatives molecules known by their anti-corrosion inhibiting powers.

Keywords: *Red algae, Inhibition, Electrochemical techniques, Corrosion, Biocorrosion, solvent extraction*

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THERMAL RESISTANCE AND TENSILE PROPERTIES STUDIES ON RESIN USED FOR COATING SUBMITTED TO 60CO RAY UP 50 KGY

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ABSTRACT

Polyethylene polymer (PE) is one of the major bulk polymers which is a widely consumed in various applications and it is used as cable coating. The interest of this work is to study the change that can be induced by storage conditions and gamma rays from 25 to 50 KGy before its application. For this reason, PE resin from two production dates: 2015 and 2017 were used, a physical, mechanical (tensile strength, elongation at break and Young modulus) thermal and morphological characterization was performed on the latter to evaluate the effect of storage. Then, the same characterization was carried out on PE/2017 resin and PE/2015 irradiated from 25 to 50 KGy. The mechanicals, thermals and morphological results showed the mediocre properties of PE/2015 compared to PE/2017, these results revealed that the period of storage has an effect on the properties of PE due to the chain scission. After bombardment with gamma rays at 50 KGY, PE/2015 increased the compatibility of the polymers by the reduction of the interfacial microvides So, the mechanical, thermal and morphological properties are improved, which puts a new material resistant to gamma irradiation up to 50 KGy, Radiation gamma at 50 KGy allowed PE stored for 3 years to regain its lost properties.

Keywords: *mechanical properties, heat ageing, PE resin, gamma radiation*

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LA STRATEGIE DE RECHERCHE DES METAUX LOURDS DANS LA TECHNOLOGIE DES HYDROCARBURES APPLICATIONÂ : RESIDUS DE PETROLE DE HASSI-MESSOUD

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ABSTRACT

Le développement de l'industrie pétrolière dans la zone de Hassi-Messaoud et les rejets qui en résultent à partir des forages pétroliers et de l'exploitation des unités de la production, impactent négativement l'écosystème. Ces rejets renferment des produits toxiques principalement, les métaux lourds et les polluants organiques. L'objectif de notre étude est de quantifier la pollution des métaux lourds dans les bourbiers de forage. Quatre techniques d'extraction sont rapportées par la littérature : la calcination, digestion humide, micro-onde et lixiviation. La quantification par les deux méthodes la spectrophotométrie d'absorption atomique à flamme (FAAS) et spectrométrie d'émission atomique couplée à une source de plasma (ICP-AES), montre que le résidu est hautement pollué et polluant, et la technique par (ICP-AES) est la plus précise pour la quantification des métaux lourds.

Keywords: *métaux lourds bourbiers de forage calcination digestion humide micro, onde lixiviation spectrophotométrie d'absorption atomique Ã flamme (FAAS) spectrométrie d'émission atomique couplée Ã une source de plasma (ICP, AES)*

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CARACTÉRISATION D'UN DÉCHET INDUSTRIEL RECYCLÉ POUR SA VALORISATION EN TECHNIQUE ROUTIÈRE – APPLICATION AU LAITIER DE HAUT FOURNEAU

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ABSTRACT

Le laitier de haut fourneau est un déchet industriel résultant de la fabrication de la fonte dans un haut fourneau, occupant de vastes étendues de terrain et causant également des problèmes environnementaux. La meilleure option de gestion pour ce produit est son recyclage. Cela conduit à la sauvegarde des ressources naturelles (granulats naturels issus des carrières). Le laitier est recyclé en tant qu'agrégat (granulat de laitier cristallisé) pour la construction des routes (couches d'assise et couche de roulement des chaussées flexibles) et pour les bétons, et en tant que sable et liant hydraulique (laitier granulé) pour la stabilisation des sols. C'est dans ce contexte que s'inscrit ce travail de recherche qui vise d'une part à valoriser un déchet industriel encombrant et néfaste pour l'environnement et d'autre part à fabriquer des granulats et des liants hydrauliques ayant des applications potentielles dans plusieurs domaines et particulièrement dans le domaine routier. L'objectif de notre étude est de réaliser une caractérisation physico-chimique de laitier et d'étudier le comportement mécanique d'une grave laitier tout laitier (GLTL) formulée, en laboratoire, à base de laitier cristallisé traitée au laitier granulé, activé par la chaux, qui joue le rôle d'un liant hydraulique. On s'intéressera à l'étude de la résistance au poinçonnement et de la portance de cette grave par le biais des essais Proctor Modifier et CBR en vue de son utilisation dans les couches de chaussées (couche de fondation et couche de base). Les résultats obtenus ont montré que le traitement d'une grave à base des granulats de laitier cristallisé avec 15% de laitier granulé améliore la portance et la résistance au poinçonnement de ce mélange notamment en présence d'eau et permet ainsi son utilisation en technique routière.

Keywords: *portance, traitement, environnement, laitier, déchet, recyclage, CBR, technique routière.*

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STUDY OF GLYCEROL ELECTROCHEMICAL CONVERSION ON PLATINUM ELECTRODE INTO ADDED-VALUE COMPOUNDS

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ABSTRACT

The price of crude glycerol has significantly decreased worldwide because of its oversupply. Many chemical and biological processes have been proposed to transform glycerol into numerous added-value products, such as glycolic acid, 1,3-propanediol (1,3-PDO), 1,2-propanediol (1,2-PDO), glyceric acid, and lactic acid. However, these processes suffer several drawbacks, including high production cost. Therefore, in this study, a simple and robust electrochemical synthesis was used to convert glycerol into various added-value compounds. Five operating parameters are studied: the nature of the reaction medium, the current intensity, the voltage, the reaction temperature and the addition of catalysts. IR spectroscopy and CPG chromatography are used to analyze samples before and after reaction. The results obtained show that the more acidic medium and the high intensities favour the conversion of glycerol.

Keywords: *Chromatographic analysis, electrolysis, electrosynthesis, glycerol, IR spectroscopic identification.*

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IMPACT OF THE CONSTRUCTION MATERIAL CHOICE OF FOLDED FACADES ON THE ENERGY EFFICIENCY OF OFFICE BUILDINGS IN HOT AND DRY CLIMATES

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ABSTRACT

Solar radiation is the most important source of penetrating heat inside the building, and in a hot and arid climate this constraint increases proportionally in east and west façades due to low solar altitude. As the building envelope is responsible for the interactions between indoor and outdoor spaces, and as lighting is imperative in an office building, thermal gains through the envelope cannot be excluded but prevented through passive or active solutions. Active and passive design methods introduce multiple solutions based on the use of different materials to minimize heat gains, so, the choice of the construction material constituting the façade is unavoidable to reach an optimal improvement of the energy efficiency of the building. In this research, an analysis of thermal performance and the energy efficiency of a hypothetical isolated office building located in Biskra in Algeria is set, while applying modification on the western and southern façades, and simulated with IDA ICE software. Two models are developed with horizontal and vertical exterior wall folding respectively for the southern and western façades. The applied modifications on the exterior wall takes into account four common construction materials available in the area which are earth-straw, alucobond cladding, brick wall, curtain walls and solar panels as high-tech cladding materials; the energy produced by the solar panels will be used for cooling and lighting and ventilation. With all these parameters, a matrix will generate 10 cases, which are then modelled and simulated. The results are compared on the base of thermal performance, heating to define the optimal construction materials in terms of energy efficiency.

Keywords: *solar panel | energy efficiency | folded façade | construction material | thermal comfort | office buildings*

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RECYCLED AGGREGATES FOR HIGH RESISTANCE CONCRETE

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ABSTRACT

Currently research is conducted on the use of waste and by-products in concrete. These products include demolition concrete, glass and brick waste, each of these waste has a specific effect on the behavior of fresh and hardened concrete, the research program therefore includes work on the recovery of this waste, as well as the development of new materials: high performance concrete, conventional concrete, self-consolidating and mortars based on recycled aggregates with integration of Algerian raw materials. In this work, we try to provide solutions for the use of recycled aggregates in the manufacture of concretes with good performance (mechanical, rheological and physical). The main purpose of this study is to demonstrate technically the possibility of using partially or totally the aggregates of the demolition of buildings as substitution of natural aggregates in the manufacture of a high performance concrete. The characteristics of recycled aggregates as well as those of fresh and hardened concrete based on these materials were analyzed and compared with those of a HRC (100% natural aggregates). Optimum strength is achieved when recycled concrete with a 28-day compressive strength greater than 60 MPa is achieved. The experimental results show that there is a possibility of making a High Resistance Concrete by the partial incorporation of the recycled granulate (70% GN + 30 GR), compressive strength of about 65 MPa at 28 days, with use of the super plasticizer which makes it possible to reduce the E / L ratio and the silica fume.

Keywords: *silica fume, High Resistance Concrete, Recycled aggregates, fresh state, hardened state.*

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EFFETS OF THE GLASS WASTE ON THE PROPERTIES OF THE OPAQUE GLAZES FOR SANITARY CERAMIC-WARE

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ABSTRACT

The present work focuses on the effects of incorporation different percentages (5, 10, 15 and 20 wt.%) of industrial glass waste (AFRICAVER Algerian company) addition in the formulation of opaque glazes for ceramic sanitary-ware. The objective of this study is substituting the feldspar and quartz with recycled industrial waste glasses (soda-lime-glass) in order to improve properties of the obtained glazes. In the present work, we used the industrial process and then thermally treated in tunnel kiln at temperature of the 1250Â°C. The obtained glazes ceramic sanitary were characterized by X-ray diffraction in order to reveal their mineralogical composition, also confirmed by FTIR and RAMAN spectroscopy. The morphological of surface of the glazes studies were observed by SEM. Subsequently, flexural strength, Vickers Microhardness, whiteness, brightness and chemical durability were investigated experimentally. The results of the microstructure of glazes revealed the crystalline phase of Zircon and glassy matrix in the surface of the glazes ceramics. The results showed the improvement of the bending strength (52.75MPa), microhardness (7.32GPa) and whiteness (up to 91%). Therefore, glass waste from AFRICAVER has a positive impact on the formulation of glazes for ceramic sanitary-ware.

Keywords: *microstructure of glazes, mechanical properties, physical, Glass waste, ceramics sanitary, glazes*

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PROMISING CANDIDATE AS ANTI-THROMBOEMBOLIC MOLECULE ISOLATED FROM CERASTES CERASTES VENOM

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ABSTRACT

This report focuses on pharmacological properties of a phosphodiesterase termed, Cc-PDE, purified from Cerastes cerastes venom by three successive chromatographies; G75-Sephadex size exclusion and DEAE exchange chromatography and affinity using Sildenafil (PDEs' specific inhibitor). Homogeneity assay on electrophoresis showed an apparent molecular weight ~ 65 kDa. Despite of this,Â Protein calculator V3.4 provided in silico a precise molecular size (73 506.42 Da). Toxicological profile revealed that Cc-PDE was free of any toxicity and no mice lethality was noticed up to a high dose i.p. administrated (10 mg/kg). Simultaneously, the enzyme exhibited a lasting anticoagulant effect until 48 h post-injection. In addition, Cc-PDE prohibited at least one coagulation factor within the intrinsic pathway in vitro leading to a promising potential to Cc-PDE as anticoagulant agent. In fact, Cc-PDE demonstrated a significant prolonged clotting time of the thromboplastin time (aPTT) notably recorded at higher concentrations of Cc-PDE highlighting the dose-response nature of anticoagulant activity. Furthermore, Cc-PDE also showed a potent anti-platelet effect up to 30% of inhibition of ADP- and ATP-induced aggregation. Flow cytometry assay proved further in addition to platelet clumping-prohibition, Cc-PDE also dose-dependently reduced the P-Selectin release from platelet Î±-granules, when the platelet activation was induced by a positive control TRAP-6 (Thrombin Receptor-Activating Peptide-6). Taking together, all these pharmaco-biological properties may confer to Cc-PDE interesting features to be a good therapeutic tool for thromboembolic diseases according to side effects of synthesized molecules.

Keywords: *Thromboembolic diseases, Pharmacological properties, Anticoagulant, Anti platelet aggregation*

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LACOO3±Δ / CARBONE AND LA0.8CA0.2COO3±Δ / CARBONE ELECTROCATALYSTS AS CATHODE MATERIALS FOR ALKALINE FUEL CELLS (AFC)

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ABSTRACT

The cathodic oxygen reduction reaction (ORR) is one of the most important processes in different energy conversion system such as alkaline fuel cells (AFC) and metal-air batteries. Many studies are focused today on the development of new electrocatalysts for the ORR in both acid and alkaline media. However, perovskite oxides are promising materials for the ORR in alkaline media. In this work, oxygen reduction reaction (ORR) was studied on two perovskite oxides: La0.8Ca0.2CoO3±Î´ (LCCO) and LaCoO3±Î´ (LCO) in NaOH (0.5 M) at 25 °C with a rotating disk electrode (RDE) at different rotation speeds. The two materials were synthetized by Pechini sol-gel process. The powders were characterized by X-Ray diffraction analysis (XRD), Morphology of the samples was determined by Scanning Electron Microscopy (SEM). The surface state of these materials was evaluated by (XPS) analysis. The two perovskite oxides and Carbone (Vulcan XC-72) were mixed and deposited as thin layer on a glassy carbon substrate. The electrochemical characterizations used for this study are: linear voltammetry, impedance spectroscopy and cyclic voltammetry. Kouteckyâ''Levich analysis on the ORR current densities was used to indicate the pathway followed on these oxides. It is worth to mention that these two materials synthetized in this study are more homogeneous and more porous compared to those obtained by citrate method witch affect clearly their electrochemical performances.

Keywords: *Chemical synthesis, Electrochemical properties, Perovskite/carbon nanomaterials, Cathode material.*

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TWO-DIMENSIONAL (2D) SIMULATION OF AMORPHOUS-SILICON / CRYSTALLINE-SILICON SOLAR CELLS USING ATLAS SILVACO

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ABSTRACT

this paper presents , two-dimensional (2D) simulation of amorphous-silicon / crystalline-silicon hetero-junction (HIT). The solar cell structure consists from bottom top to of a n-type a-Si (BSF), n-type c-Si substrate, an intrinsic a-Si buffer layer and p-type a-Si. using ATLAS software package of SILVACO TCAD, current density-voltage (J-V) and power density-voltage (P-V) curves generated show that the proper choices of physical models of mobility, generation and recombination, as well as defining the defect parameters of amorphous silicon, can successfully and accurately simulate the electrical characteristics of HIT solar cells. The structure with the best characteristics in terms of VOC, JSC and efficiency Î· was obtained by optimizing the most important parameters of HIT structure: the level of doping and thickness of layers.

Keywords: *amorphous / crystalline silicon, heterojunction, solar cells, ATLAS.*

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EFFECT OF MINERAL ADDITIONS ON THE RHEOLOGICAL AND MECHANICAL BEHAVIOR OF MORTARS

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ABSTRACT

Current researches aim for the production of eco-materials in order to achieve sustainable development. In the field of construction, concretes are part of it. These must respond to the triple economic, ecological and durability requirements. The incorporation of mineral additions, in substitution of a part of the cement, arouses an increasing interest from the researchers, because of the improvement of the performance of these concretes. This work aims to study the effect of some mineral additions, natural or from different waste, on the rheological and mechanical properties of mortars. By varying the E/C ratio, four additions were used, métakaolin, blast furnace slag, natural pozzolan and ground glass. The mortar based on métakaolin significantly increases the water requirement compared to other mortars. On the other hand, it improves the mechanical resistance in the short and long term, regardless of the E/C ratio. The slag, as an addition, presents a good rheological behaviour, but weak resistance. Pozzolan and crushed glass improve the water requirement and mechanical strength compared to the control.

Keywords: *MINERAL ADDITIONS, RHEOLOGY, MECHANICAL RESISTANCE, E/C RATIO*

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TRACKING THE DEGRADATION OF INTERMEDIATE PRODUCTS DURING HETEROGENEOUS FENTON OXIDATION OF THREE MODEL AQUEOUS POLLUTANTS

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ABSTRACT

The degradation pathway of three model aqueous pollutants, methyl orange, methylene blue, and paranitrophenol, in a Fenton process based on the use of maghemite/silica microspheres as magnetically separable heterogeneous catalyst was investigated. The utilization of different analytical methods, including UV-vis spectroscopy, non-purgeable organic carbon (NPOC) measurements, quadrupole-time-of-flight high resolution mass spectrometry (Qtof-HRMS), liquid chromatography coupled with mass spectrometry (LC-MS), and ion chromatography (IC) allowed the identification at different times of many transformation products for each pollutant. These analyses confirmed first the existence of intermediates which have been already evidenced in previous studies on the advanced oxidation of these pollutants. However, new products were also identified, particularly thanks to the highly accurate Qtof-HRMS analyses. The evolution with time of the main intermediate compounds was monitored by LC-MS. It was then possible to propose an overall transformation pathway for each pollutant. The same classes of reactions, especially ring-hydroxylations and N-demethylations, were observed for the three pollutants, although specific features were also pointed out. While some common features with other advanced oxidations processes were found, the highlighted specificities could be related to the selection of the catalyst and to the experimental conditions used for the degradation tests.

Keywords: *Fenton reaction, Heterogeneous catalysis, Advanced oxidation mechanism Quadrupole, time, of, flight mass spectrometry, Analytical chemistry*

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DEGRADATION CATALYTIQUE DES POLLUANTS ORGANIQUES AQUEUX PAR DIFFERENTS PROCEDES D'OXYDATION AVANCEE

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ABSTRACT

L'eau a toujours figuré au premier plan des ressources naturelles primordiales pour la vie de l'Homme. Cependant, la raréfaction de cette ressource, la dégradation sans cesse accrue des écosystèmes aquatiques a pris, au cours des dernières décennies, une ampleur catastrophique et constitue une des dimensions environnementales les plus préoccupantes du XXIe siècle. De ce fait, le traitement des eaux est indispensable pour la préservation de notre environnement. Il permet de limiter l'impact des diverses pollutions liées à l'activité humaine. De nombreux procédés chimiques ou encore physiques sont en application. Cependant, chacune de ces méthodes présente des avantages et des inconvénients. Les progrès les plus récents dans le traitement de l'eau ont été faits dans l'oxydation des composés organiques «biologiquement récalcitrants». Ces procédés reposent sur la formation d'entités chimiques très réactives qui vont décomposer les molécules les plus récalcitrantes en molécules biologiquement dégradables ou en composés minéraux tels que CO2 et H2O ce sont les Procédés d'Oxydation Avancés (POA). Ces méthodes reposent sur la formation in situ des radicaux hydroxyles HO., qui possèdent un pouvoir oxydant supérieur à celui des autres oxydants traditionnels. Ces radicaux sont capables de minéraliser partiellement ou en totalité la plupart des composés organiques. Dans ce travail, nous avons étudié et comparé les performances de différents procédés d'oxydation avancée (oxydation par le peroxyde d'hydrogène, Fenton homogène, Fenton hétérogène et photocatalyse hétérogène à base de TiO2 sous irradiation solaire) pour la dégradation d'un colorant synthétique (vert malachite). Nous avons également étudié l'effet des paramètres expérimentaux sur la dégradation de ce polluant citons le pH du milieu, la concentration initiale de l'oxydant, et de polluant. Â L'ensemble des résultats obtenus lors de ce travail est encourageant et prometteur ce qui indique la haute efficacité des procédés étudiés en traitement des effluents de l'industrie textile, en particulier le procédé photocatalyse sous radiations solaires qui se caractérise par des rendements intéressants et une mise en oeuvre assez facile.

Keywords: *Traitement des eaux, POA, Colorant, Dégradation*

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PREPARATION AND CHARACTERIZATION OF THE SYSTEM ZNO/MGO: APPLICATION TO THE PHOTODEGRADATION OF EMERGING ORGANIC POLLUTANT.

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ABSTRACT

The degradation of Quinoline Yellow (QY) in aqueous solution was investigated on ZnO/MgO system under solar light. The material was prepared by a nitrate method and characterized by X-ray diffraction, thermal analysis Differential Scanning Calorimetry (DSC) , Thermogravimetric (TG), electrical conductivity, diffuse reflectance and photo-electrochemistry. Formation of magnesium oxide along with zinc oxide nanocomposite has been confirmed by XRD. Optical properties investigated by UV-DRS showed decrease in maximum reflectance (~25%) due to incorporation of MgO within ZnO nanoparticle. Electrochemical study showed higher electrochemical. The QY photo-degradation, monitored by high performance liquid chromatography was found to have overall high conversion rates. The optimal performance was observed for a catalyst dose of 0.25 g Lâˆ’1 and QY concentration of 200 mg Lâˆ’1 at pH ~7. By applying the optimal operating conditions, QY conversion of 92% was obtained after 60Â min. Additionally, the mineralization was investigated by the Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC). Dye was completely mineralized after 120 min. The kinetic indicated that the Langmuir-Hinshelwood (L-H) model was well fitted to the experimental data and the degradation obeyed to first order with a half life 32.60 min. A photocatalytic degradation mechanism is proposed to explain the high activity under visible light.

Keywords: *Langmuir, Solar light, photocatalysis, Quinoline Yellow, nitrate method, Hinshelwood model*

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A NEW RECOVERY OF PLASTIC WASTE FOR THE CAPTURE OF TOXIC MOLECULES IN LIQUID EFFLUENTS

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ABSTRACT

Chemical recycling of thermoplastic wastes is of crucial importance to the environment. Sulphonation is one of the ways to change the original chemical and physical properties of wastes thermoplastic. It is possible to receive a water-hydrophilic thermoplastic derivative, which can be used as a adsorbent agent through sulphonation from polymer hydrophobic in water. The problem of environmental pollution by polymer waste can be resolved by its chemical modification into useful products. The obtaining of effective sulphonated resins for dyes treatment from chemically modified polymer wastes could be one of the ways. We report the use of sulphonated waste thermoplastic in the removal of cationic dyes from wastewater. Waste thermoplastic collected from dump sites in Algiers were activated through sulphonation to produce a modified resin. The presence of the sulphonic group was studied with Fourier transform infrared spectroscopy (FTIR). Spectrophotometer was used to determine the concentrations of residual dyes after batch adsorption experiments including Blue Basic 41 and Basic Yellow 28 (BB41, BY28) two dyes mostly used in textile industries. Sulphonated thermoplastic reduced BB4 from 160 to 29 mg/L similarly reduced BY28 from 160 to 72 mg/L. The adsorption data followed the Langmuir, Freundlich and Tempkin isotherms. Maximum adsorption capacities as quantified by the Langmuir parameter qmax onto modified waste polymer was 230 mg/g for BB41 and was 222 mg/g for BY28. The data were analysed using pseudo first order and pseudo second order Lagergren equation and the adsorption kinetics of the dyes BB41 and BY28 was found to follow the pseudo second order kinetic model. Interpretation of the sorption data in terms of separation factor (SF) suggested that the removal of BB41and BY28 from water mainly occurred through chemisorption.

Keywords: *thermoplastic, polymers, waste, environment, sulphonation removal*

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HIGHT DIASTEREOSELECTIVE SYNTHESIS OF BIS (Î±-AMINOPHOSPHONATES) BY LIPASE CATALYTIC PROMISCUITY

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ABSTRACT

The Î±-aminophosphonates are of a great biochemical and pharmacological effects,1 they are structural analogues of amino acid and they have received much attention owing as enzyme inhibitors.2 Bis(Î±-aminophosphonates) are the prime constituents of organophosphorus compounds consistently used in agriculture and medicine.3 Enzymatic promiscuity is the ability of an enzyme active site to catalyze several different chemical transformations.4 Herein, and in the continuation of our previous work,5 we applied catalytic promiscuity with lipase as an efficient â€˜Green' method for the synthesis of bis (Î±-aminophosphonates),6 using multicomponents condensation of two equivalents of aromatic aldehydes, one equivalent of benzidine and two equivalents of diethylphosphite by Kabachnik-Fields reaction. This original strategy gave access to a novel series of bis(Î±-aminophosphonates) with high diastereoselectivity and very satisfactory yields, in a short reaction time and under green chemistry conditions.

Keywords: *Kabachnik Fields reaction., Enzymatic promiscuity, Bis (Î± aminophosphonates)*

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EXTRACTION OF SILICA FROM DIATOMITE FOR OPTICAL APPLICATIONS AND FOR SOLAR GRADE SILICON (SOG-SI) DEVELOPMENT

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ABSTRACT

The world today knows a great progress in technology and due to the large consumption of energy; today we must think and develop the sources of this energy and the mechanism of its use. However solar energy today is one of the most important renewable and alternative energy energies. They should be best used as clean, man-friendly energy, which is the cleanest, most powerful and great sun-sized and radiation-capable on the planet. Photovoltaic cells are the world's interest and technology due to their importance in converting solar energy into electrical energy. There is a need for further development and optimization of high-efficiency and low-cost solar cells. Currently solar cells dominate the photovoltaic industry based silicon industry. Â In this work; we reported develop a new and easy purification approach for the improvement of the porous structure of crude diatomite by applying an electric field. We applied two different electric fields 30V and 60V to test the different developments. Analysis by scanning electron microscopy shows an improvement in the porous structure of crude diatomite; more than that The results suggest that an application of an electric field has sufficient potential as an alternative method for improving diatomite quality; After we go to the chemical purification of diatomite Algerian ; we carried out MEB analysis, where results showed successfully removing of the impurities from raw diatomite. Thereafter, We noticed significant decrease in the concentrations of the iron ; magnesium ; calcium but the concentration in alumina It remains high as we recorded the silicon ratio increases this confirmed the result of last step of purification electric.

Keywords: *chimical purification, purification electric, silicon, photovoltaic*

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THE EFFECT HARDENING THE INITIAL STEAM BY SOLAR ENERGY ON THE COMPRESSIVE STRENGTH OF CONCRETE CONTAINING THE LIMESTONE FILLERS

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ABSTRACT

An experimental program was conducted to studying the effect hardening the initial steam by solar energy on the compressive strength of concrete containing the limestone fillers. We set the same criterion of workability to all concretes made order to lead a rational study. In the first instance we started with evaluate the influence of the addition of limestone fillers at the cement on the compressive strength of concretes with age a function of the content of cement the limestone fillers. Thereafter, we studied the hardening effect the initial steam by solar energy on the compressive strength of concretes containing the limestone fillers. The introduction of the addition of the limestone fillers in the cement production enables, in addition to the ecological and economic gain, an improvement in the compressive strength of concretes, also the results obtained show that the use of hardening the initial steam by the solar energy improves the compressive strength of concretes compared with the curing with water, during the first seven days of hardening.

Keywords: *Limestone fillers, Solar energy, Hardening the initial steam, Concrete, Compressive strength.*

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OPTIMIZATION OF DISPERSION COEFFICIENT USING THE GENETIC ALGORITHM

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ABSTRACT

The advection dispersion equation (ADE) was used to describe interactive solutes transport through a saturated sand column. A numerical solution for ADE is obtained using the finite volume method (FVM) based on the tri-diagonal matrix algorithm (TDMA). The dispersion coefficient was estimated using the genetic algorithm. Numerical solutions are verified using the measured values obtained by S. Semra (2003) at different flow rate. The results show that the advection dispersion equation gives a better description to the breakthrough curves (BTCs) with lower values of root mean square error (RMSE) and higher values of determination coefficient (R2). Also the dispersion coefficient increases with the flow rate and it is dependent with the pore velocity by the equation: DL=au2+bu.

Keywords: *dispersion coefficient, breakthrough curves, advection dispersion equation, genetic algorithm*

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PRODUCTION OF BIOCHAR FROM PALM WASTES AND ITS APPLICATION FOR DYES ADSORPTION IN SINGLE AND BINARY SYSTEMS

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ABSTRACT

Organic dyes are a significant pollutants in wastewater which leads to serious health risks and damages the aquatic environments. The current study focused on synthesis of a highly efficient Biochar by using the date palm petioles as low cost precursor. The single and binary compenent adsorption proprities of synthetic dyes, namely, Crystal Violet (CV) and Methyl Orange (MO), were investigated in batch system. FTIR, XRD, BET and pHPZC analysis technics were used to characterize the prepared biochar. Results show that the carbonaceous material obtained at 700°C exhibited a high specific surface area (SBET) and important pore volume (VTotal). The adsorption kinetic for both dyes was rapid for the first few minutes and reached fast equilibrium. The adsorption capacity of the individual dyes in the single system is higher than in the binary compenent system. With regard the monocomponent system, kinetic data are well described by the pseudo-second order and diffusion intraparticle kinetic models. The Langmuir model gives the best fitting, the maximum adsorption capacity (Q0max) was found to be 195.5 and 232.9 mg/g for CV and MO dye, rspectively. According to these results, the prepared biochar was derived from low cost residue and considered a good adsorbent to remove pollutants such as synthetic dyes.

Keywords: *adsorption, biochar, palm petioles, dye, adsorption.*

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REAL SCALE ROAD TEST SECTION USING COAL WASTE AS ROAD BASE MATERIAL

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ABSTRACT

Coal wastes are a big problem for Bechar and Kenadsa cities, theirs total volume approach 4 million cubic meter, and fill about 20% and 70% of urbanizable area of Bechar and Kenadsa cities. The objective of this paper is to study the possibility of reuse of coal waste in the road construction; specially in road base of a roadway and study thiers environmental impact on the surface and ground water. In this paper, a real scale road was realized in Kenadsa with the cooperation of socio-economic partners (OPGI and municipality of Kenadsa). Dimension of the test section 70.00 m x 3.50 m and thickness of the base layer was 0.20 m, it was realized after a laboratory study, the optimal dosage of waste was determined (25 % Coal waste and 75% tuff), which lead to acceptable geotechnical characteristics. After one year, the test section shows some cracks in the pavement. Investigation shows that cracks was due to local swell at base layer, which is the result of schist particles, which presents a high rate of swelling, a solution was proposed, coal waste must be pretreated before using as base layer road material. Leaching tests show that the tuff donèt absorbs all pollutants, thus a treatment by hydraulic binders is necessary.

Keywords: *schist, waste reuse, road, base layer, Coal waste, leaching test*

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ASSESSMENT OF AN OFFICE BUILDING GLAZED FACADE IMPACT UPON ENERGETIC CONSUMPTION AND ENVIRONMENT UNDER SEMI-ARID CLIMATE IN ALGERIA

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ABSTRACT

The building sector is well known for its high energy-intensive demand and the pollution incurred by the GHG effect. This drives for research attempts to reduce energy consumption at the source through various means among which the right choice of main characteristics of the building envelope that can have significant consequences on its energy performance. In office buildings, glazed facades are more and more widespread either to allow enough daylight indoors, keep contact with the outdoor word or even for some unjustified reasons. Yet, despite their advantages, they constitute a weak point for heat exchange between the interior and exterior because generally of their low insulating capacity which requires an accurate control so to prevent heat loss and hence reduce heating and air conditioning users' demand. The main objective of the proposed paper concerns an investigation of the environmental impact an office building glazed façade upon indoor environment. This includes also analysis of the resulting indoor thermal behavior and energetic requests. The building in question is located in the region of Oum-El-Bouaghi (Algeria) characterized by semi-arid climate. To carry out this study it was analyzed the effect of the fully glazed external wall upon thermal comfort and energy consumption within two landscaped office spaces with different orientations. The simulation work includes also a comparative research between different glass types in order to put forward design proposals that might most optimize the compromise between sufficient natural lighting and acceptable thermal comfort level. To be more exhaustive, it was also surveyed the environmental balance of the heating and cooling loads before and after the setting of the most adequate glazing proposal. The numerical simulation is carried out on the TRNSYS-V17 software whose model has been validated by the in-situ measurements results taken on three consecutive days of the summer period of 2019.

Keywords: *Numerical simulation, Building materials properties, Energetic & environmental assessment, Office building, Thermal comfort.*

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NUMERICAL STUDY OF THE BEARING CAPACITY OF A SAND LAYER ON CLAY IN THE PRESENCE OF REINFORCEMENT.

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ABSTRACT

This paper studies the bearing capacity of strip footings on a soil stratified. The upper layer, that the footing is placed on it, is sand and the bottom layer is soft clay with and without reinforcement. Using model Mohr-Coulomb, soil accounting with cohesion and friction angle is important when building foundations. The effect of stratified based on the bearing capacity of foundations and as well effect of reinforcing the top layer with horizontal layers of geotextile reinforcement on the bearing capacity as well as reinforcement effect of reinforced and unreinforced subsoil during settlement of the foundation. The results indicate that the insertion of geotextile layers in the replaced sand not only sufficiently improves the footing performance, but also leads to a significant reduction in the depth of the reinforced sand layer needed to reach the allowable settlement.

Keywords: *Stratified soils, Foundations, Bearing capacity, Geotextile.*

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NUMERICAL SIMULATION OF CDS-FREE CIGS SOLAR CELLS

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ABSTRACT

Cu(In,Ga)Se2 thin film solar cells have been widely studied in the last few years because of their high efficiency, long-term stable performance and potential for low-cost production in terrestrial applications. However, in this photovoltaÃ¯c device structure, the use of cadmium sulfide as a buffer layer has several effects on the solar cell performances. Indeed, the quantum efficiency of such a solar cell drops at short wavelengths due to optical absorption losses from the CdS layer. Moreover, the use of cadmium is undesirable because of its toxicity.Thus, a use of alternative buffer layers is investigated in order to achieve high efficiency Cd-free CIGS thin film solar cells. Among several alternative buffer layers, ZnO, ZnS and ZnSe are good candidates to replace the CdS buffer layer due to their wide bandgap. In this work, an improvement in the short circuit current has been achieved using a numerical simulation with technological computer aided design Â«Â TCADÂ Â» software. The quantum efficiency shows a significant improvement in the short wavelengths for the different buffer layers with a conversion efficiency exceeding 23%.

Keywords: *CdS free, efficiency, CIGS solar cells, buffer layer.*

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A SEMI-EMPIRICAL MODEL TO PREDICT THE SOLUBILITY OF SOLID SOLUTE IN SUPERCRITICAL CARBON DIOXIDE

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ABSTRACT

Supercritical carbon dioxide (scCO2) is widely used in separation processes applied to the food, chemistry, pharmaceutical and material industries. The knowledge of the solubility of solid solutes in scCO2 is essential for the design and optimization of extraction, fractionation and purification processes. The experimental measurement of the solubility (thermo-physical property) of such compounds in scCO2 is laborious and costly. To avoid expensive and tedious experiments and to fulfill the lack of solubility data and/or pure component property data needed to estimate solubility, a need exists to develop flexible and robust predictive models to estimate the solubility of solid solutes in a supercritical solvents using limited information. In this work, a new density-based model has been developed to correlate the solubility of 130 solid solutes in supercritical fluids, the database has been collected from previously published papers in literature which contains 3269 experimental data points. The performance of this model has been compared to five previously published models. The accuracy of the proposed model was evaluated using statistical parameters and found to be 0.9978 for the correlation coefficient and 7.42% for the average absolute relative deviation. Results show that the developed model is more accurate and can be used as an alternative powerful modeling tool for the solubility of solid solutes in supercritical carbon dioxide (scCO2).

Keywords: *Supercritical fluids, Solid solutes, Solubility, Density based model.*

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ESSAIS DE BIOREMEDIATION DANS LE CAS DE POLLUTION ORGANIQUE ET INORGANIQUE D'UN SOL

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ABSTRACT

Il est souvent constaté que la pollution du sol n'est pas due à un seul contaminant mais à plusieurs contaminants de différente nature qui peut être organique et inorganique. L'objectif de notre travail est de voir l'efficacité de l'application de bioremédiation sur un sol pollué par deux substances l'une de nature organique à savoir les phtalates (issus de déchets de plastic) et l'autre de nature inorganique qui est le chrome. Dans le cas de notre étude nous nous sommes intéressés aux phtalates et le chrome du fait qu'ils sont considérés comme des substances toxiques persistantes très nuisibles à la santé de l'homme. Ces substances sont largement utilisées dans différentes industries qui se retrouvent souvent dans différents compartiments de l'environnement d'une façon accidentelle ou par négligence du respect des lois en vigueur. Parmi les procédés de dépollution du sol la bioremédiation est une technique largement appliquée de nos jours. Lors de nos essais de bioremédiation il a été constaté qu'après l'inoculation du sol pollué par les souches de Staphylococcus et de Bacillus, nous avons noté une nette amélioration du taux de dégradation des polluants par rapport au sol non traité dont le taux de dégradation des polluants par la flore indigène du sol est très faible. D'après nos résultats, la souche de Staphylococcus a donné le meilleur taux de dégradation des phtalates (64,6 %), aussi un meilleur taux de réduction du chrome VI (69%). Nous pouvons conclure qu'il est possible d'avoir un bon rendement dans le traitement de sol pollué par différents polluants par des méthodes biologiques notamment la bioremediation.

Keywords: *Bioremediation., pollution de sol, Chrome, phtalates*

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PHYSICAL AND MECHANICAL PROPERTIES OF CONCRETE CONTAINING PVC WASTE AS AGGREGATE

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ABSTRACT

The global annual production of plastics rose sharply from 1.7 up to 280 million tons during the period between the years 1950 and 2011. A large proportion of plastic products and goods, such as bottles of water and soda, food packaging, etc, are thrown away right after their first use, causing the generation of considerable amounts of post-consumer plastic waste.Reusing solid plastic wastes to produce other innovative materials, such as recycled plastic aggregate concrete, is considered as one of the most economical and cost-effective alternatives. This work is part of an ambitious sustainable development program. For this purpose, PVC waste is used in the form of aggregates (sand 0/3 and coarse aggregate 3/8) in the preparation of a number of concrete specimens. These plastic aggregates were used as partial replacement of natural aggregates at the following substitution rates: 25%, 50% and 75%. The experimental results obtained indicate that there is a difference between the physical and mechanical properties of plastic wastes-based concretes and those containing natural aggregates.

Keywords: *PVC waste aggregate, Lightweight concrete, Waste valorization*

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ORGANIC SOLAR CELLS WITH SOLUTION-PROCESSED CONDUCTING POLYMERS ACTIVE LAYER

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ABSTRACT

Organic photovoltaics (OPVs) are particularly promising alternatives for solar-cell generation of energy because of the abundance of their constituent elements and base materials, their low priced, and ease of chemical processes compared with traditional silicon based solar cells .The active layer is the main component of OPVs. For over two decades conducting polymers (CPs) with Ï€-conjugated chain structure have been quickly developed and used as active layer in OPV applications owing to their high optoelectronic proprieties. This work highlights recent improvement on fabrication of (CPs) through solution based coating techniques among them spin coating are widely applied in order to deposit organic materials on glass substrates focused on its fundamental working principles was revealed. This research aims to synthesize a conjugated aromatic poly {(2-pyrrole-co-cinnamaldehyde)} (PPNC) catalysed by Maghnite-H+ which is accessible in the form of a montmorillonite silicate clay sheet, The organic materials was analyzed using various characterization methods such as UV- visible spectroscopy, H-NMR, C13- NMR, FTIR, SEM, AFM , cyclic voltammetry and profilometer.

Keywords: *cinnamaldehyde)., co, pyrrole, (2, conjugated polymers, H+, Maghnite, spin coating, organic solar cells*

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SYNTHESE ET CARACTERISATION DE NOUVEAUX MATERIAUX DES DERIVES NITROBENZYLIDENE ET COPOLYMERES A BASE DE PYRROLE POUR APPLICATIONS EN DISPOSITIFS PHOTOVOLTAÃ□QUES

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ABSTRACT

La maîtrise des propriétés optoélectroniques des copolymères conjugués par substitution de leurs radicaux est un moyen prometteur pour augmenter l'absorption de lumière et le transport des charges dans la couche active des dispositifs organiques. Dans cette étude, nous présentons la synthèse chimique de trois différents dérivés de benzaldéhyde conjugués et de copolymères à base de pyrrole qui représentent un sérieux candidat pour remplacer les cellules solaires à base du silicium catalysé par la maghnite-H+. En effet, l'utilisation de ce catalyseur évite la toxicité des produits ainsi que le coût qui est beaucoup moins important que celui des catalyseurs classiques. La seconde partie porte sur la conception en couches minces des copolymères obtenus par dip coating sur des substrats en verre a été développée. Enfin, les films minces de polymères conducteurs ont été caractérisés par les différents méthodes d'analyses tel que la spectroscopie infrarouge (IR), la spectroscopie (UV), (RMN1H), (RMN13C), MEB, la voltammètrie cyclique.

Keywords: *dip coating., H+, Maghnite, pyrrole, cellules solaires organiques, Nitrobenzylidène*

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ABSORBANT LAYER THICKNESS EFFECT ON AMORPHOUS HYDROGENATED SILICON ULTRA-THIN SOLAR CELLS

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ABSTRACT

The electronic properties of ultra-thin semiconductor films play an important role in various electronic devices such as transistors, memory devices and solar cells. In order to evaluate the effect of the active layer thickness on ultra-thin single junction solar cell performance, a simulation study was executed using AMPS-1D simulator. The solar cell that we investigate in this work has the following structure P nc-SiOx: H /I a-Si: H /N a-Si: H. This structure presents a short circuit current (Jsc) of 11.018 mA/cm2 (10.413), an open circuit voltage (Voc) of 0.877V (0.874), a fill factor of 0.714(0.709), an efficiency of 6.898% (6.511%) for 70nm (50nm) i-layers thickness, respectively. We found that not only the short circuit current density (Jsc) decreases, but also the open circuit voltage (Voc) and fill factor (FF) decreases with the reduction of i-layer thickness, which is opposite to the expectation .The dependence on the thickness of i-Layers was established.

Keywords: *ultra thin film, thickness, i layer, AMPS 1D, solar cell*

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QUANTIFICATION DES PARAMETRES DES METAUX LOURDS DANS LA BOUE DE BOURBIER DE LA REGION DE HASSI MESSAOUD PAR DEUX TECHNIQUES FINES ICP-AES ET FAAS.

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ABSTRACT

L'objectif de ce travail est La quantification des paramètres physicochimiques, des indicateurs de pollution, du pouvoir biodégradable et des métaux lourds, de la boue de bourbier de la région de Hassi Messaoud. Les métaux lourds (Cadmium, Plomb, Cuivre, Zinc, Fer, Manganèse, Chrome et Nickel, Mercure), ont été évalués et comparés par quatre techniques de digestion (Calcination, Attaque acide, Micro-ondes et Lixiviation) et deux techniques d'analyses fines (ICP-AES, FAAS). Les analyses préliminaires par lixiviation de la boue, Ã savoir les paramètres physicochimiques, les indicateurs de pollution et le pouvoir biodégradable, montrent que cette boue présente une pollution minérale et organique importante. Par ailleurs, Les différentes techniques d'extractions et d'analyses pour l'estimation des métaux révèlent une grande concentration des métaux lourds dans la boue de bourbier. Les rejets pétroliers présentent des risques important sur l'environnement. Les valeurs des paramètres de la pollution dépassent de loin les valeurs limites réglementées.

Keywords: *ICP, Valeurs limites, Métaux lourds, Rejets pétroliers, AES, FAAS.*

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ETUDE DU POUVOIR ADSORBANT D'UN CHARBON ACTIF ET UN CHARBON ACTIF IMPREGNE AVEC Î'-CYCLODEXTRINE POUR L'ELIMINATION DES IONS PB2+ EN SOLUTION AQUEUSE

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ABSTRACT

L'imprégnation du charbon actif commercial a permis d'obtenir un adsorbant dont la capacité d'adsorption est nettement supérieure à celle du charbon actif commercial utilisé comme référence. La caractérisation des adsorbants par spectroscopie infrarouge a conduit à des spectres similaires par rapport au type de fonction. L'examen de tous ces spectres fait apparaitre des bandes d'adsorption dans le domaine infrarouge qui confirment la présence de groupements hydroxyles et de la fonction phénoliques qui offrent à la surface adsorbant un caractère acide. Les essais réalisés dans un réacteur agité fermé ont permis d'étudier l'influence de plusieurs paramètres ayant une influence sur la capacité d'adsorption des ions pb2+ en solution aqueuses. Les résultats obtenus ont permis de montrer que la meilleure efficacité d'élimination des ions pb2+ est obtenus pour : - La durée de contact adsorbat- adsorbant 60minutes ; - La vitesse d'agitation du mélange réactionnel à 450 tr/min; - pH de la solution Ã pH 6; - la concentration de la suspension de 0,1 g/ 250mg.

Keywords: *Î², charbon actif commercial, Adsorption, cyclodextrine, plomb.*

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CULTIVATION SYSTEMS AND WATER MANAGMENT IN THE SOUTH-WEST OF ALGERIA CASE STUDY OF NAAMA REGION

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ABSTRACT

This study highlights the different growing systems adopted in a region steppic (wilaya of Naama). This is a system: traditional classic where there is a diversity of crops (market garden and fruit), oasien is based mainly on date palm cultivation and bench that includes market gardening and fodder crops. Upstream a survey was conducted in the region of naama to identify the potential of local cultures and existing constraints. This analysis allowed us to evaluate the varietal diversity, both herbaceous and woody, with a short vegetative cycle. perennial that takes place in these systems. These food crops are sources of food and income for the pastoral population. Constraints of biotic and abiotic orders have been taken from different plant species. Our proposals for improving the production of its systems primarily concern crop protection against climatic hazards, maintain and improve soil productivity, adapt these systems to water availability, fight against pests and consolidate the socio-economic environment.

Keywords: *Water Managment, Naama, System of culture, Agriculture, Oasien system*

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SYNTHESE, CARACTERISATION DES HYDROXYDES DOUBLES LAMELLAIRES [CUFE-CO3] ET APPLICATIONS A L'ELIMINATION DE COLORANTS ANIONIQUES EN PHASE AQUEUSE

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ABSTRACT

Les industries textiles rejettent de grandes quantités d'eaux usées présentant un risque de toxicité majeur. Il existe déjà des traitements tels que l'adsorption sur le charbon actif qui est un processus efficace mais onéreux et qui produit une boue constituant elle-même une menace environnementale. Les argiles anioniques pourraient être des adsorbants à la fois économiques et moins polluants. Ceux sont des hydroxydes doubles lamellaires à grandes capacités d'adsorption due à leurs charges de surface, avec des propriétés intéressantes d'échange anionique et de porosité, qui permettent d'envisager l'intercalation d'une grande variété d'anions (organiques ou inorganiques) et le piégeage ou l'immobilisation d'espèces diverses, conférant à ces matériaux hybrides une réactivité particulière. Dans cette étude, les hydroxydes doubles lamellaires (HDLs) à base de cuivre et de Fer avec des différents rapports molaire Cu2+/Fe3+ = 2, 3 et 4 et intercalés avec des ions carbonates ont été synthétisés par la méthode de co-précipitation. Ces matériaux ont été caractérisés par la DRX et FTIR et utilisés comme adsorbants pour éliminer deux colorants anioniques à savoir le Méthyle Orange (MO) et le Rouge Congo (RC). Lors des expériences de l'adsorption sur les HDLs, plusieurs paramètres telle que le temps de contact, la concentration initiale de colorant, la masse de l'adsorbant et le pH de la solution ont été examinés. Les investigations ont notamment portés sur la modélisation des cinétiques et les isothermes d'adsorption. Les résultats expérimentaux indiquent que les HDLs non calcinées avec des rapports molaires Cu2+/Fe3+ = 2 et 4 démontrent la plus grande quantité d'adsorption du RC et MO respectivement.

Keywords: *Rouge Congo, Méthyle orange, HDLs, CuFe, adsorption*

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REMOVAL OF RED CONGO IN AQUEOUS SOLUTION BY THE ACTIVATED CARBON PREPARED ON THE BASIS OF AN AGRICULTURAL WASTE

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ABSTRACT

Processes using adsorption are often a complementary technique to a conventional water purification system in case you want to remove organic substances in the dissolved state. We have studied the adsorption of Red Congo by activated carbon prepared from agricultural waste CORN COB. Two activation methods are used on the corn cob; the chemical method that is using phosphoric acid as an activating agent and the physical method which consists of a hot treatment under a stream of water vapor. For the sake describing activated carbon prepared for its surface chemistry and morphology, a procedure is carried out by different methods such as pH and pHpcz, FTIR, BET and SEM. We have been asked to evaluate the influence of reaction parameters such as adsorbent mass, initial concentration and the temperature on the removal efficiency of Red Congo. The kinetic equilibrium data show a fast movement which is from the second order kinetics and good adsorption capacity following the Freundlich model.

Keywords: *adsorption, activated carbon, corn cob, BET*

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BEHAVIOR OF CONCRETE USING COAL WASTE (HEAP) IN HOT WEATHER

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ABSTRACT

Concreting in hot regions (eg southern regions of Algeria) suffers from enormous difficulties in the conservation of materials, mixing, setting up, setting and hardening concrete. The consequences pose major short- and long-term problems, in terms of both fresh and hardened behavior, affecting the good performance and long-term performance of concrete, as well as its durability especially in aggressive environments. Coal waste in the Bechar region are abundant and a worrying waste. The incorporation of aggregates of waste is a recovery method and a contribution to environmental protection. This study was carried out to investigate the effects of temperature and coal waste (heap) addition on concrete strength under simulated hot weather conditions. The study consists of comparing the properties of a reference concrete with concretes incorporating aggregate of coal waste (heap) at seven levels of heap as content (0, 1, 2, 3, 4, 5 and 6 percent fine aggregate replacement) and two levels of temperature (25 and 50°C). The simulation of the hot climate in the laboratory is subjected to temperature 50°C with relative humidity of about 10%, wind speed at 10km/h and E/C ratio constant between all mixtures. The results revealed that coal waste (heap) inclusion was more effective can be used for enhancement of properties of concrete. The optimum heap as content varied between 1 to 4 percent. However, the resistance at higher temperatures was positively affected by inclusion of coal waste.

Keywords: *Compressive and Flexural strength, Environment, Coal Waste (Heap), Hot Weather Concreting, X Ray Diffraction.*

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PROJET COSOTIA: AIDE À LA DÉCISION POUR LE CHOIX DES TECHNOLOGIES SOLAIRES À CONCENTRATION POUR LA PRODUCTION D'ÉLECTRICITÉ

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ABSTRACT

Le projet CoSoTIA (Concentrated Solar Technologies for Industrial Applications) initié par le CRTI en collaboration avec l'URMPE porte sur l'étude et le développement de concentrateurs solaires CSP pour des applications industrielles. Nous présentons dans cet article des outils d`aide Ã  la prise de décision pour le choix d`une technologie de concentration solaire pour des sites en Algérie. Ils seront utilisés pour: la comparaison entre différentes technologies de concentration solaire i.e.Â : cylindro-parabolique, parabole, tour solaire, etc. Les modèles utilisés présentent en compte les coÃ»ts des projets et les caractéristiques de site, ils intègrent des connaissances d`ingénierie (économiques, sociales, techniques et environnementales). Les informations nécessaires à la prise de décision, produites par ces outils sontÂ : le coÃ»t total du projet, les indicateurs Ã aspects économique, sociaux, techniques et environnementaux. Les études de cas présentées ont été conduites sous l'environnement SAM Advisor qui a été développé pour évaluer les capacités à mettre en oeuvre pour produire une expertise pour les différents acteurs Ã travers une application sur un site donné (par le client).

Keywords: *concentration solaire, analyse multicritères, Aide à la décision, CSP, SAM Advisor*

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CERASTES CERASTES VENOM: A RENEWABLE ENERGY WITH A PHARMACOLOGICAL POTENTIAL.

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ABSTRACT

Disequilibrium in the hemostasis mechanisms that control the growth and the size of the thrombusis one of the factors that favors the development of diseases related to vascular disorders. Snake venoms is a biomass containing a number of molecules that interfere with hemostasis like the disintegrin that are large family of non-enzymatic proteins that have a conserved Arg-Gly-Asp (RGD) motif and interfere in platelet aggregation step. In this study we aimed to cerastategrin from Cerastescerastes venom and to study its effect on the platelet functions. The purification of disintegrin from the venom was conducted by successive chromatographies and the fraction 4 was applied to SDS-PAGE followed by MALDI-TOF-MS-ES. After that, we studied effect of the purified disintegrin on the platelet morphology and on platelet secretory function bygiemsa smear and flow cytometry analysis using CD62P as a biomarker of Î± granules degranulation,in parallel, in vitro anti-aggregation effect of the purified disintegrin, was performed in the presence of ADP and fibrinogen. The electrophoresis of the fraction 4 showed a single band with a molecular mass of about 14kDa and show that the disintegrin sequence consisted of 128 amino acid residues.The anti-aggregation test revealed that in the presence of disintegrin, the platelets didn't aggregate.After the stimulation of platelets with 100 ÂµM of ADP, a formation of pseudopodia was noticed, whereas, when the PRPs were incubated with 10 Âµg/mL of the disintegrinthe pseudopodia were absent since they totally disappeared in presence of 20 Âµg/mL. Furthermore, when PRPs were preincubated with the disintegrinprior to stimulation with TRAP-6, the quantity of externalized P-Selection was significantly reduced comparing with the quantity produced when the agonist was used alone.In this context, a detailed investigation intohe pharmacologically active compounds present in snake venom may serve as a valuable molecular research tool on renewable energy and sustainable development.

Keywords: *Platelet morphology, renewable energy, aggregation activity, Anti, Disintegrin, P, Selectin*

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DISINTEGRIN OF THE VIPER VENOM:FROM DEVELOPMENT SUBSTAINABLE TO THERAPEUTIC MOLECULE

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ABSTRACT

Snake venom toxins are considered as renewable energy and biomass sourcing have evolved to affect many prey physiological systems including hemostasis and thrombosis. The disintegrin are large group of non-enzymatic proteins that are mostly isolated from viperid snake venoms, they have a conserved Arg-Gly-Asp (RGD) motif on a loop and hence interfere in the final common step in platelet aggregation of the interaction between αIIBβ3 integrin receptors on platelets and fibrinogen. Based on these inhibitors two therapeutic agents, Integrillin® and Aggrastat®, were designed.In this study, we aimed to purify a new disintegrin and characterize its anti-platelet aggregation effect. The purification of disintegrin from the venom was conducted by successive chromatographies and the fraction containing the small peptides was applied to SDS-PAGE followed by MALDI-TOF-MS-ES. Once the purification was achieved, in vitro anti-aggregation effect of the purified disintegrin, was performed in the presence of ADP and fibrinogen (platelet agonists), and followed by in vivo test of the anticoagulation effect and toxicity, using a range of concentration bolus. The purification yielded 6 fractions, from high to low molecular weight. The electrophoresis of the fraction 6 showed a single band with a molecular mass of about 9 kDa, and show that the disintegrin sequence consisted of 86 amino acid residues. The anti-aggregation test revealed that in the presence of disintegrin, the platelets didn't aggregate in both cases when fibrinogen and ADP were used. In vivo experiment confirmed the anti-thrombotic effect of disintegrin, able of reducing blood coagulation in all range of concentration. Interestingly, disintegrin didn't show any in vivo toxicity up to 1 mg/kg of mice weigh. Consequently, the effect of the disintegrin on the platelet aggregation canpotentially be utilized for advancement of human medicine and as cardiovascular diagnostic tools that have already arisen from studies of snake venoms.

Keywords: *aggregation activity, Anti, Disintegrin, development sustainable, RGD motif, Anti, coagulation*

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EFFECT OF MODIFIED PANCREATIC PORC LIPASE ON SUGAR ESTERS SYNTHESIS

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ABSTRACT

This work concern enzyme-driven green synthesis of industrially important molecules. Indeed the enzymatic synthesis of products from renewable sources represents a new challenge in biotechnology. In this context, sugar fatty acid esters are non-ionic biosufactants widely used in industry (pharmaceuticals, cosmetics, detergents, and food products). In this work, immobilized and surfactant-coated lipase from Pancreatic porc (PPL) were designed to enhance the synthesis. The enzyme was modified first with sorbitans esters using coating process by span 60, 65, 80 and 85. Immobilization on celite and silice was then investigated. These lipases are subsequently tested in the enzymatic esterification reaction of D-glucose by lauric acid to compare their catalytic activities with that of the free one. This adsorption process has made it possible to increase the thermal stability of the modified lipases and to prolong their existence, which makes it possible to keep their activity. These changes often depend on the biosurfactant used as coating material and the support for immobilization. This study allowed us to achieve conversions around 50% for coated lipases at 60°C. Those obtained for the immobilized lipases are low compared to the coated ones. The high activities were probably due to an improved dispersion of the coated biocatalyst in organic media.

Keywords: *Keywords: bio, sufactants, lipase, span, coated lipase, immobilized lipase.*

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CORRELATION BETWEEN CONDUCTIVITY AND OPTICAL PROPERTIES OF POLYCRYSTALLINE SILICON FILMS PREPARED BY LOW PRESSURE CHEMICAL VAPOR DEPOSITION

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ABSTRACT

The polycrystalline silicon layers deposited from thermal decomposition of silane (SiH4) by Low Pressure Chemical Vapor Deposition (LPCVD) technique at temperature 620Â°C, either undoped or diffusion phosphorus doped (5.38x1019 to 1.8x1020 cm-3), have been studied from optically and electrically point of view. The structures are composed of p-type -oriented monosilicon substrate, silicon oxide layer (100 nm) and polysilicon film (175 nm). Polysilicon layers were characterized by spectroscopic ellipsometry (SE) to determine the optical properties namely the refractive index (n) and extinction coefficient (k), in addition to the thickness (d). These parameters were determined from Î¨ ellipsometric angles analyses. The two sources of errors are instruments and sample model used for results deduction. A Cauchy layer model was used to compute the optical parameters in 450-900 nm wavelength range. The Hall Effect (HE) measurement was used to obtain the conductivity, mobility and free carrier concentration. This paper presents a new approach of the correlation between electrical conductivity and optical properties with different doping levels of polysilicon thin films. This approach suggests that there is a straightforward relation between theses properties allowing us to deduce electrical characteristics with a non-contact method.

Keywords: *electrical conductivity, correlation, thin films, Polysilicon, ellipsometry, Hall Effect*

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FE-BASED MATERIALS OF INSTITUTE LAVOISIER FOR EFFICIENT REMOVAL OF TEXTILE DYE BY ADVANCED OXIDATION VIA PERSULFATE ACTIVATION

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ABSTRACT

The worldwide concern about water pollution has encouraged the development of advanced oxidation treatments. Sulfate radicals-based advanced oxidation processes (SR-AOPs), which are of great practical importance due to their high efficiency, simplicity, good reproducibility, and easy handling, are emerging technologies to degrade the recalcitrant organic pollutants in aqueous solution. Therefore, design and fabrication of the effective heterogeneous catalysts for persulfate activation is a key issue to realize the desirable activity and long-term stability in organic contamination. In recent years, Materials of Institute Lavoisier (MILs) are an interesting type of inorganic-organic hybrid porous crystalline materials built from trivalent metal centers and carboxylate bridging ligands, showing high surface area, large pore volume and tunable topology; has particularly , Fe-based MILs can provide iron active sites useful for heterogeneous reaction, including MIL-53(Fe) and MIL-101(Fe) prepared via a facile solvothermal process were introduced as both adsorbents and catalysts to generate powerful radicals from persulfate for textile dye Direct Red 16 (DR16) removal in aqueous solution. The morphology and physicochemical properties of the samples were investigated by XRD, SEM and EDX. Because of the high specific surface area of the materials, we tested the adsorption of the two MILs. Meanwhile, the catalytic activities in persulfate oxidation system under solar light were investigated. The results showed that the sequence of the materials ability in the combination of adsorption and photo-degradation was MIL-101(Fe)>MIL-53(Fe), which had a close connection with the activity of metal ion in active site of the catalysts and their different cages in size. The MIL-53(Fe) and MIL-101(Fe) material prepared evidenced the best catalytic performance, even at neutral pH, with a remarkable structural stability.

Keywords: *Photo, Adsorption, Sulfate radicals, Materials of Institute Lavoisier (MILs), degradation, Solar light.*

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ANALYSIS OF SLUDGE PRODUCED AT THE WASTEWATER TREATMENT PLANT OF ALLELICK ANNABA FOR AGRICULTURAL VALORIZATION

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ABSTRACT

The increase in the number of sewage treatment plants in Algeria generates a significant amount of sewage sludge. The reuse of sludge produced for agricultural purposes, to enrich the soil without the use of chemical fertilizers. The objective of this study is the characterization of waste sludge produced at the Annaba Allelick wastewater treatment plant before spreading. The assessment of most of the elements present in the sludge produced at the Annaba Allelick wastewater treatment plant was carried out by X-ray fluorescence spectroscopy. It is a widespread qualitative and quantitative analysis technique. The qualitative analysis of the sludge indicates the presence of the following elements: Ca, Si, Fe, Al, P, S, K, Mg, Ti, Cl, Zn, Sr, Ba, Zr, Cu, Mn, Pb, Cr, As, Ni, V, Br, Rb, Y, Na, Se, Ga. The sludge studied contains heavy metals whose contents are below the maximum values allowed by the Algerian standard NA 17671. These elements are chromium, copper, nickel, zinc and lead. They are present respectively with the following concentrations: 0.08 mg/g, 0.36 mg/g, 0.07 mg/g, 1.05 mg/g, 0.25 mg/g. The analysis also indicates the presence of the nutrients such as, Phosphorus, Potassium, Calcium, Magnesium and Sulfur, with acceptable levels which may cover, in whole or in part, the needs of crops. They are present respectively with the following contents 9.59 mg/g, 18.42 mg/g, 564.18 mg/g, 21.85 mg/g 20.80 mg/g.

Keywords: *X, heavy metals, spreading, treatment plant, sludge, ray fluorescence spectroscopy.*

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STUDY OF PHYSICO-MECHANICAL CHARACTERISTICS OF CONCRETE MADE WITH RECYCLED GRAVEL AND PREPARED SAND

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ABSTRACT

The depletion of natural deposits of aggregates and the difficulties to open new quarries make it necessary to look for new sources of supply. Recycling and waste recovery are now considered as an alternative solution in the future.Aggregates are considered essential components in the composition of ordinary concrete or concrete for specific use. Such utilizationof recycled aggregates is of great importance from a technical and environmental point of view.The present studyconcerns the use of aggregates from the crushing of concrete waste as a replacement for natural aggregates with a sand of standardized particle size of determined fraction.An experimental program for the characterization of a local recycled concrete based on prepared sand was planned. Four types of concrete were formulated including a control concrete mixture with crushed aggregates, 8/16 recycled gravel concrete and prepared sand.The substitution amount of the fine fraction of prepared sand was 15% for slag and 10% pozzolan as mineral additions.The principal objective of this research work is to study the effect of partial substitution of recycled aggregates on the physical and mechanical characteristics and on the resistance to aggressive environments of a local recycled concrete based on a prepared sand.The results obtained show the positive effect of using a recycled local sand-based concrete on the mechanical properties of concrete while keeping an acceptable workability for the studied concrete mixtures.

Keywords: *aggressive environment, prepared sand, Recycled concrete, slag, pozzolan.*

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SYNERGISTIC REMOVAL OF HUMIC ACID IN WATER BY COUPLING PHOTOCATALYTIC DEGRADATION AND ULTRAFILTRATION USING FE-PILLARED CLAY

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ABSTRACT

Bentonite is one of the most widely used low-cost clays due to its abundant availability. It's composedÂ mainly of montmorillonite (Mt) and considered one of the most common industry. The pillared clays have a vast range of potential applications in catalytic process. Pillared clays (PILCs) are formed by exploiting the expandability and cation exchange of smectites. Large hydroxyl polycations can be intercalated through cation exchange into the interlayer space of the clay followed by calcinations, to transform hydroxyl polycations into stable pillars. PILCs have a microporous structure; high specific surface areas and high thermal stabilities. Humic substances are complex heterogeneous acidic biopolymers that represent a significant fraction of Natural Organic Matter (NOM) present in freshwater sources. Negative effects of humic substances in drinkable water include undesirable color and taste, absorption and concentration of organic pollutants, as well as biochemical decomposition in water distribution systems. An interesting solution in water treatment technology is to use a so called hybrid system that combines photocatalysis with membrane filtration. In such systems, the contaminants could be decomposed into simple compounds by photooxidation, while the photocatalyst could be separated by the used membrane. The new data demonstrates that a hybrid system, combining heterogeneous photocatalysis with suspended Mt-Fe particles and UF membrane filtration, can successfully operate in a 63.5 mm dead-end cell (Model 8200, Amicon Corp.), for the removal of HA. Typical concentrations of HA (10 mg/L) usually encountered in effluents and freshwater sources were degraded. The overall removal efficiency of HA was higher (95.5%) due to the synergistic effects of photocatalysis and membrane filtration processes.

Keywords: *Water treatment., Ultrafiltration, Photocatalysis, Pillared clays, Humic acid*

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ZNO THIN FILMS GROWN BY PLASMA SPUTTERING PROCESS FOR OPTOELECTRONIC APPLICATIONS: EFFECT OF SUBSTRATE TYPE

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ABSTRACT

In the present work, we report on the preparation by the RF magnetron sputtering technique of zinc oxide (ZnO) thin ï¬ • lms with a deposition time of 50 min corresponding to 150 nm thickness on glass, quartz and silica-on-silicon (SiO2/Si) substrates. The effect of substrate type on the structural, morphological, optical and photoluminescence (PL) properties are investigated by X-ray diffraction (XRD), scanning electronic microscopy (SEM), atomic force microscopy (AFM), ultraviolet-visible (UV-Vis) and PL spectroscopies. XRD patterns show that all deposited films crystallized in a hexagonal Wurtzite structure with a preferential orientation along the (002) plane. Better crystalline quality and higher c-axis orientation are observed in the film deposited on SiO2/Si substrate. SEM and AFM images reveal that morphology, grain size and surface roughness of the films are influenced by the substrate type. The ZnO film deposited on quartz substrate shows a very smooth surface morphology with the smallest root-mean-square roughness (Rrms) value around 2.00 nm. According to UV-Vis measurements with respect to substrate, ZnO thin films deposited on quartz substrate are highly transparent with about more than 87% average optical transmissions in the visible region. However, a fall in the average transmission (84.5%) is observed for those prepared on glass substrate. Moreover, the calculated values of the optical band gap (Eg) are found to be 3.23 and 3.24 eV for the ZnO films deposited on glass and quartz substrates, respectively. Room temperature PL spectra of the ZnO films deposited on glass and quartz substrates exhibit a sharp and intense UV emission and two main weak bands centered at blue and red regions. However, the emission of the film prepared on SiO2/Si substrate is very weak consisting of UV and several visible bands.

Keywords: *optoelectronic., photoluminescence, RF sputtering, substrate type, ZnO thin films*

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SUBSTRATE TYPE INFLUENCE ON RF SPUTTERD AZO THIN FILM PHYSICAL PROPERTIES

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ABSTRACT

In this work, aluminum-doped zinc oxide (AZO) thin films are deposited on glass and quartz substrates at room temperature by a radio frequency (RF) sputtering technique. The effect of the substrate type on the structural, morphological, optical and electrical properties of the prepared thin films are investigated using various characterization techniques. X-ray diffraction (XRD) measurements have shown that AZO thin films prepared by this technique have a hexagonal wurtzite structure with higher preferred growth orientation (002), better crystallinity and larger crystallite size as quartz substrates are used. Scanning electron microscopy (SEM) and atomic force microscopy (AFM) images have shown that morphology and surface roughness of the prepared thin films are influenced by the substrate nature. Optical properties such as transmittance and optical bandgap energy (Eg) are examined using UV-Visible spectrophotometry. The results have indicated that all thin films are highly transparent with an average transmittance of more than 80% in the visible region. In addition, the optical bandgap energy is found to be independent of the substrate type. Measurements using the four-point method have demonstrated the influence of substrate type on the electrical properties of AZO thin films.

Keywords: *Physical properties, Substrate type, RF sputtering, AZO thin films, Optoelectronic applications*

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EVALUATION DE LA FLUIDITE ET DU COMPORTEMENT RHEOLOGIQUE DES MORTIERS AUTOPLAÇANTS ELABORES AVEC DES CIMENTS TERNAIRES A FAIBLE IMPACT ENVIRONNEMENTAL

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ABSTRACT

Dans cette étude, l'influence combinée de trois additions minérales (poudre de marbre (PM), poudre de brique (PB) et métakaolin (MK)) sur le comportement rhéologique des mortiers autoplaçants (MAP), a été traitée. Sept mélanges sont désignés dont un à base de ciment ordinaire et sert comme mélange de référence, et les autres Ã base de liant ternaire (ciment-PM-MK et ciment-PM-PB). Les pourcentages de substitution sélectionnés pour la combinaison PM-PB sont 10%, 30% et 50%, alors que pour la combinaison PM-MK, on a choisi 10%, 20% et 30% (rapport massique égal à 1 (PB/PM=1, MK/PM=1)). Les essais qui ont été réalisés sont l'étalement au mini-cône, le temps d'écoulement moyennant le mini-entonnoir en V, le seuil de cisaillement et la viscosité plastique à l'aide du rhéomètre. Les résultats obtenus montrent que le mélange ternaire ciment-PM-MK semble avoir une meilleure fluidité et un comportement rhéologique amélioré par rapport à la combinaison ciment-PM-PB.

Keywords: *rhéologie, fluidité, additions minérales, mortier autoplaçant, environnement*

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RECYCLAGE ET DECOLORATION DES EFFLUENTS TEXTILES VIA LES BOUES ACTIVEES

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ABSTRACT

Cette étude contribue à comprendre le fonctionnement des boues activées des eaux usées dans l'industrie textile SITEX et de déterminer les souches prédominantes susceptibles d'être bénéfiques pour la biodégradation des polluants. 16 échantillons d'eaux et de boues activées ont servi pour l'isolement des souches bactériennes viables cultivables, moyennant des méthodes classiques, par croissance sur milieux sélectifs. Cette étape est suivie par l'identification des différentes souches qui consiste à réaliser la coloration de Gram, le test de la catalase et de l'oxydase et enfin l'identification biochimique par les différentes galeries API (20E, 20NE, 10 S, 20 Strep et 50 CHB). 19 souches bactériennes ont été isolées à partir des boues activées et des eaux et ont été identifiées comme étant Enterococcus (1) faecium/faecalis, Staphylococcus epidermidis (1) et différentes souches du genre Bacillus (10), Sphingomonas (3) et Pseudomonas (3). Nous avons prouvé par le dénombrement, que les deux bassins de traitement et d'assainissement biologique des effluents, fonctionnent avec un rendement proche et ayant une charge relativement semblable en genres bactériens viables cultivables. Afin d'avoir une idée sur le pouvoir de décoloration des souches les plus abondantes dans la station sur l'effluent de l'industrie de textile SITEX, nous avons étudié l'effet de 5 souches (Enterococcus, Bacillus (B1, B4) Sphingomonas (Sh2) et Pseudomonas (P1) qui présentent un pourcentage de décoloration variable respectivement de l'ordre de 44%, 26%, 24%, 53% et 52%. Nous souhaitons reprendre ces essais biologiques par un plan d'expérience tout en réalisant différentes combinaisons entre les bactéries nouvellement isolées et identifiées afin de donner des résultats plus précis Ã l'industrie de textile SITEX.

Keywords: *bactéries dépolluantes, boue activée, Effluent textile, décoloration*

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THE EFFECT OF DOPING ON THE ELECTRICAL AND OPTICAL PROPERTIES OF THIN FILMS OF IRON OXIDE

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ABSTRACT

The cold of this abstraction is; addition of attenuate films of iron oxide benumbed (2.5%, 5%, 7.5%) magnesium by aeriform aerosol pyrolysis address at bottle substrate, we use (FeCl3) as forerunner and (Mg(NO3)2) as antecedent of doping. The altitude of our plan are; (Temperature of substrate is 420°C, Distance amid the allure and the substrate is 20cm, Temps of degradation is 4min, Concentration of solutions is 0.1M, Temperature of assay is 400°C). For that, assorted techniques of assay were used: The structural backdrop of the films were advised by X-ray diffraction (XRD), and (FTIR) spectroscopy, and optical backdrop by the UV-Vis spectroscopy and electrical backdrop by four point technique. Structural assay of iron oxide attenuate films by DRX has accepted the anatomy amorphous. But (FTIR) spectroscopy has accepted the communication beating (Fe-O) and (Mg-O), are abide amid 465cm-1 and 545 cm-1) with the communication beating (O-H) of hydroxyl and chargeless baptize amid (3000cm-1- 4000cm-1) assay by spectroscopy UV-Visible; appearance that average transmittance at area arresting (55% - 65%). the absolute optical gap assorted amid (4.02 and 4.09eV) and the aberrant optical gap assorted amid (3.92 et 3.98eV) and activity of urbach assorted (de 250 a 254meV).the electrical measures by four point address appearance that all the attenuate films of iron oxide benumbed by magnesium present acceptable apparent resistance, assorted amid (5—106 et 19—106) allusive with the attenuate films of iron oxide no benumbed by magnesium (242—106).

Keywords: *Pneumatic spray pyrolysis., Doping, Iron oxide, Thin films*

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INFLUENCE OF THERMALLY DILATED GRAPHITE ON THE DIFFERENTIAL CALORIMETRIC OF THE FLUOROPLASTIQUE

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ABSTRACT

The objective of this work is the study by differential calorimetry of four fluoroplastique-based samples containing different concentrations of thermally dilated Graphite (GTD) at various dispersions. We have noticed that the heating speed plays a very important role. The increase in heating speed, from 5 to 10 and then to 15°c/mn, modifies the calorimetry behavior of our nanocomposite, regardless of concentration and/or dispersion. All curves contain a calorimetry anomaly whose form and intensity depend on concentration and dispersion. The onset temperature of this calorimetry anomaly changes from one sample to another. We have shown that nanomaterial containing the smallest concentration in GTD and having a high dispersion degrades at high temperatures when heated with the highest speed. It is the most resistant to thermal shocks. The introduction of the GTD into a polymer matrix has improved the thermal properties of Nanocomposite and its use has become possible in a wide range of temperature.

Keywords: *transition, nanotube, expanded Graphite, heating rate, DSC, dispersion.*

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SLUDGE OF WASTE WATER TREATMENT PLANT (WWTP) AT THE HEART OF SUSTAINABLE DEVELOPMENT THROUGH THE PRODUCTION OF ECO-CEMENTS.

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ABSTRACT

This study is a contribution to valorization even the elimination of sludge storage in wastewater treatment plants (WWTPs). Indeed, after calcinations of the sludge, ash obtained is incorporated into cement, for the production of ecological cements, or eco-cements. This approach constitutes a durable solution and unquestionable safeguarding of our ecosystem of any nuisance which can endanger the balance of our environment. The green-cement is developed by substitution of different amount of ash (5%, 10% and 15%) obtained into the clinker. Mortar samples using the green-cement were tested in hardened state.The tests of the evolution of the mechanical compressive strength and flexural strength were according to time (for 2, 7 and 28 days). The results obtained showed a remarkable improvement in the strength of concrete in the cured state.

Keywords: *substitution, durable, sludge, valorization, cement*

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RECOVERY OF PNEUMATIC WASTES BASED ON ISOPRENE POLYMER "STUDY OF CONCRETE INCORPORATING RECYCLED RUBBER CRUMB".

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ABSTRACT

Preserving the environment in a vision of sustainable development is a shared responsibility. The tires-based polymers isoprene- used represent a waste cumbersome, polluting and worrying. In Algeria, according to A N P C E, about 49 thousand tons of rubber tires are imported; every year more than 45.65 thousand tires reach the end of their life and they are rejected. The problem of used tires in ALGERIA is to re-use or recycle these tires. The civil engineering sector using the tire ground technique in slope protection seems to be the leading sector of valorization of this waste, but as the main objective in this work we will study the physico-mechanical properties of concrete incorporating the recycled rubber crumb. The results obtained show the negative effect of partial replacement of the recycled rubber aggregates on the physical properties, and decrease of the density and thus on the mechanical response of the concrete.

Keywords: *concrete, recovery of rubber waste, Polymer isoprene, development sustainable.*

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MODELING OF CONTAMINANT TRANSPORT WITH KINETIC LANGMUIR SORPTION

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ABSTRACT

In this study, we combined the advection dispersion equation (ADE) with kinetic Langmuir sorption to describe interactive contaminants transport through a saturated sand column. A numerical solution for ADE is obtained using the finite volume method (FVM). The dispersion coefficient was estimated using a nonlinear least-squares optimization approach based on the levenberg-marquardt method. Numerical solutions are verified using the measured values obtained by S. DRIDI-DHAOUADI (1997) at different initial concentration. Comparing with the non linear transport model (IMPACT), The advection dispersion equation combined with Langmuir sorption gives a better description to the breakthrough curves (BTCs) with lower values of root mean square error (RMSE) and higher values of determination coefficient (R2). Also the dispersion coefficient increases with the initial concentration.

Keywords: *breakthrough curves, finite volume method, Contaminant transport, Langmuir sorption.*

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ASSESSMENT OF THE OUTDOOR THERMAL COMFORT IN TRADITIONAL SETTLEMENT OF SOUTHERN ALGERIA.

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ABSTRACT

The object of our study is to evaluate the effect of urban geometry on microclimate and outdoor thermal comfort. In this context, â€œthe RayMan pro 2.1' software was adopted to define UTCI index applying in hot and arid climates, exactly, in the urban fabric of the Ksar of â€œDachra el hamraâ€•, El Kantara in Biskra city, Algeria, to define the most efficient urban geometry in term of summer thermal comfort by studying the real impacts of the urban form on the solar control and microclimatic conditions. studying the correlation between the geometry of the street estimated by the ratio H/L, the sky view factor (SVF), its orientation and the evolution of the physical variables (Ta, MRT, Ws) and the values of UTCI index. Significant relationships were found between UTCI index, urban geometry and heat stress in outdoor environments. The results of this research have shown the effect of urban design strategies on modifying the microclimatic conditions in hot summer for outdoor spaces in hot-arid climate.

Keywords: *urban morphology, urban microclimate, outdoor thermal comfort, hot and arid climate, UTCI index.*

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TRAITEMENT D'UNE SOLUTION AQUEUSE CONTENANT LE PARACÉTAMOL ET LE BLEU DE MÉTHYLENE PAR ADSORPTION SUR L'ALUMINE ET LE PHOSPHATE D'ALUMINIUM SYNTHÉTISÉS PAR VOIE ÉLECTROCHIMIQUE

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ABSTRACT

La dépollution de l'eau contenant des substances pharmaceutiques, colorants, pesticides, métaux lourds et autres composés organiques et inorganiques suscite un intérêt à l'échelle mondiale. La présence croissante de ces polluants dans l'eau, même en faibles quantités, représente un risque de toxicité important pour l'être vivant. Deux composés ont été retenu por cette étude : le paracétamol et le bleu de méthylène (BM). Il existe de nombreux adsorbants utilisés pour les éliminés des aux usées. Ces adsorbants présentent différents inconvénients, d'où la nécessité de trouver des alternatives à bas coût et plus efficaces. Dans le présent travail, une alumine et le phosphate d'aluminium (AlPO4) ont été synthétisés par voie électrochimique et utilisés comme adsorbantspor cette étude à partir d'une solution aqueuse. Différents paramètres ont été étudiés et optimisés tels que la masse des adsorbants, la concentration initiale, le pH, ainsi que le temps de contact. Les résultats ont montré que les adsorbants utilisés n'éliminent pas le paracétamol, mais ils présentent une efficacité dans l'élimination du BM. L'équilibre est atteint rapidement au bout de 50 minutes sur AlPO4 et de 40 minutes sur l'alumine. La modélisation de la cinétique d'adsorption suit le modèle de pseudo-second ordre pour les deux adsorbants. L'isotherme d'adsorption a permis de déterminer la capacité d'adsorption qui était de 0.002 mmol/g et 0.0015 mmol/g sur AlPO4 et l'alumine, respectivement. La modélisation non linéaire de Sips est la plus adaptée pour l'adsorption du BM sur l'alumine et sur AlPO4; avec une quantité maximale très proche de la quantité expérimentale qui est de 0.00137 mmol/g, 0.00197 mmol/g, respectivement. L'étude de la surface spécifique des deux adsorbants a donné les résultats suivants : 1,6 m2/g pour AlPO4 et 1,11 m2/g pour l'alumine. L'étude de l'effet du pH et de la masse d'adsorbant a montré une importante influence sur l'adsorption.

Keywords: *Phosphate d'aluminium, Alumine, Adsorbants, Mots clés : Adsorption, Paracétamol, Bleu de méthylène.*

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FRESH AND HARDENED PROPERTIES OF RUBBERIZED SELF-COMPACTING MORTAR

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ABSTRACT

The amount of waste rubber has gradually increased over recent years because of over-growing use of rubber products. The disposal of waste rubber has caused serious environmental problems. The utilization of such waste in the production of self-compacting mortar (SCM) is a decent and sustainable solution to mitigate these threats and issues. The aim of this study is to evaluate the properties in the fresh (mini-cone and V-funnel) and hardened properties (bulk density, flexural and compressive strength, Ultrasonic Pulse Velocity, water absorption and thermal conductivity coefficient) of SCMs with different content of crumb rubber extracted from waste tires. Six SCM mixtures were prepared. The reference mix made with natural sand (SCM0) while the other five mixes were made with crumb rubber in which the natural sand was volumetrically replaced by crumb rubber at ratios of 20 %, 30 %,40 %, 50 % and 60 %, respectively. The work concluded that the inclusion of rubber crumb in the SCM samples contributed to both mechanical and thermal changes in the property of rubberized SMCs.

Keywords: *sustainable solution., thermal property, mechanical roperty, compacting mortar, self*

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NUMERICAL INVESTIGATION ON COMBUSTION CHARACTERISTICS OF BOTH DIESEL AND DUAL FUEL ENGINE AT PART LOAD CONDITIONS USING CONVERGE CFD SOFTWARE

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ABSTRACT

Petroleum resources are finite and, therefore, search for their alternative non-petroleum fuels for internal combustion engines is continuing all over the world. Moreover, gases emitted by petroleum fuel-driven vehicles harm the environment and human health. Dual-fuel engine (diesel/NG) represents one of a possible solution to reduce emissions from a diesel engine. Therefore, this method has been given a lot of attention from many researchers to improve engine performance and reduce diesel consumption, particularly at full loads. However, it is necessary to study the dual-fuel (DF) combustion process with more details at part loads, due to the poor performance at these conditions. This study numerically investigated the effect of DF (dual fuel) operating mode on combustion characteristics of an existing diesel engine using natural gas as primary fuel and neat diesel as pilot fuel at part loads by adopting a 3D-CFD simulation using the code CONVERGE. A series of numerical simulations were carried out, the purpose of which to gain a better understanding of the combustion behavior in dual-fuel engines. The results are first validated using experimental data. A comparison with neat diesel fuel operation is achieved.

Keywords: *Computational fluid dynamics, Combustion characteristics, Natural gas, fuel Diesel engine, Dual, CONVERGE CFD.*

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METHOD TO EXTRACT THE MODEL PARAMETERS OF SOLAR CELLS USING THE I-V CHARACTERISTICS

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ABSTRACT

With the increase in the capacity of photovoltaic generation systems, studies are being actively conducted to improve system efficiency. To develop precise solar cell simulators or design a high-performance photovoltaic generation system, it is important to accurately understand the physical properties of solar cells. However, solar cell models have a non-linear form with numerous parameters. To obtain accurate parameter values, assumptions that differ from real operating conditions must be made to avoid computational complexity. In this work, we proposed a new method to analyze the experimental current-voltage of the solar cell models, and to the numerically extraction of the intrinsic solar cells parameters (i.e., the ideality factor and the series resistance). The method suggested in the present paper is based on the use of an external variable resistor put in series with the solar cell studied. The validity of these methods is confirmed by its application to current-voltage theoretical and experimental characteristics.

Keywords: *Ideality factor, series resistanc, Parameter extraction, Solar cell model, I-V characteristics*

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DURABILTY OF STABILIZED EARTH CONCRETE USED FOR KSOUR REHABILITATION

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ABSTRACT

Ksour of algerian south, classified as World Heritage of UNESCO, are earth constructions, building with the old technical. Where are widely used in the saharan desert region but very few approached from a scientific point of view. These old structures suffer over time of damage under difficult weather conditions. Several rehabilitation solutions has been given but the the problem remains continues for lack information about the behaviour of these structures. However, their very complexe architectural design and the materials used are very different compared to the known masonry construction and more discussed in the literature. Our contribution in this study is, in first, concern the understanding the mechanical behaviour of the original material used to build the Ksours. Secondly,the addaition of others naturel local material to original material in order to increase their proprieties such as the waterproof and the protective. Thes material must be able to adapt to these structures while respecting their originality in terms of architectural appearance and also their mechanical behaviours.

Keywords: *Cement, Lime, Stabilizing, Stabilized Earth Concrete, Compression and Tensile Strength, Durability*

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COMPARISON OF ARTIFICIAL NEURAL NETWORK (ANN) AND RESPONSE SURFACE METHODOLOGY (RSM) PREDICTION IN WATER ABSORPTION OF RECYCLED CONCRETE AGGREGATES

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ABSTRACT

In this study, a comparative approach was made between response surface methodology (RSM) and artificial neural network (ANN) to predicting and modeling the water absorption by immersion and capillarity of a concrete containing concrete's recycled coarse aggregates and that, for different range of cement content and slump. To achieve this, a central composite design was used for three variable processes modeling (cement content in the range of 300 to 400 kg/m3, percentage of recycled coarse aggregate from 0 to 100% and slump from 5 to 12 ± 1 cm). The results indicate that the water absorption by immersion and capillarity of recycled concrete is strongly influenced by the cement content, %RCA and slump ($p < 0.01$). The results in statistical terms; relative percent deviation (RDP), mean squared error (MSE), root mean square error (RMSE), determination coefficient (R2) and adjusted coefficient (R2adj), reveals that the both approaches ANN and RSM are a powerful tools for the prediction of the compressive strength. Furthermore, ANN and RSM models are very well correlated with experimental data. However, artificial neural network model shows better accuracy.

Keywords: *Recycled aggregates, Artificial neural network, Response surface methodology, water absorption.*

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SIMULATION D'UN CHAUFFAGE EAU SOLAIRE CAPTEUR STOCKEUR PAR LES RESEAUX DE NEURONES ARTIFICIELS

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ABSTRACT

L'objectif de ce travail est la modélisation numérique pour définir les caractéristiques d'un chauffage eau solaire capteur stockeur pour déterminer leurs performances optiques et thermiques par des températures expérimentales et prédites par les réseaux de neurones artificiels (RNN). Pour cette raison, un RNA a été formé à partir des données de trois types de systèmes, tous en utilisant le même capteur sous différentes conditions météorologiques. De cette façon, le réseau a été formé à accepter et à traiter un certain nombre de cas inhabituels. Les données présentées comme entrées sont, le fonctionnement du système (jour ou nuit), le type de système, l'année, le mois, le jour, le temps, la température ambiante, et le rayonnement solaire. Les sorties du réseau sont les quatre températures de l'unité de stockage.la valeur de l'erreur relative absolue moyenne obtenue lors de la phase de test et la phase de la généralisation ne dépasse pas 1.7%. Le modèle neuronal conçu a permis de reproduire avec une très bonne précision les données expérimentales. Les résultats obtenus dans ce travail montrent que la méthode proposée peut être utilisée avec succès pour la modélisation des capteurs stockeurs solaires.

Keywords: *Réseaux de neurones artificiels, eau solaire, chauffe, Capteur stockeur, Caractérisation., Modélisation*

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PROPRIETES ELECTRO-OPTIQUE DES COUCHES ANTIREFLETS A BASE DE NANOPARTICULES DE CARBURE DE SILICIUM

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ABSTRACT

L'objectif principal de ce présent travail était d'élaborer des couches minces composites à base de nanoparticules de carbure de silicium incorporées dans une matrice organique, en utilisant un polymère qui est le polyvinyle alcool (PVA). L'utilisation des nanoparticules de carbure de silicium a un effet très important dans la conversion d'ondes comme étant des nanoparticules luminescentes. Bien évidemment le dépôt de ces couches composites sur les substrats en silicium joue le rôle d'une couche antireflet de descendent luminescent (LDS), d'une part et de l'autre part la texturisation des substrats e nanofils et nanopyramides est aussi réduit la réflectance des rayons solaires et par conséquence une amélioration de rendement de ce type de cellules solaires est très remarquable. Afin de confirmer cette propriété des caractérisations électro-optiques ont été effectuées que se soient sur les matériaux de basse (PVA/SiC) ou bien sur les couches composites élaborés et même sur une cellule solaire avec et sans dépôt de la matrice SiCÂ /PVA. Les résultats obtenus à travers les images MEB ont révélé la qualité morphologique des substrats, la longueur et la densité des nanofils et pyramides avant de déposer nos couches composites, tandis qu'après dépÃ´t cette caractérisation nous a informé sur la qualité de dépôt. Mesures EQE ont montré une intensification notable des pics lorsque le dispositif PV a une faible réponse optique. Les propriétés électriques de la cellule solaire étudiée dépendent largement de la nature des nanoparticules de SiC jouant le rôle d'espèces luminescentes dans la couche de conversion d'ondes.

Keywords: *couche antireflet, Carbure de Silicium, conversion d'ondes et cellule solaire*

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SYNTHESIS AND CHARACTERIZATION OF A NEPHELINE SYENITE MATERIAL, DEDICATED FOR THE STORAGE OF RADIOACTIVE WASTE.

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ABSTRACT

In this study, we synthesized two ceramic matrices of a syenite nepheline, RbAlSi2O6 and Cs0.5Rb0.5AlSi2O6, doped with Rb and Cs, able to confine alkaline / alkaline earth elements contained in radioactive waste. The synthesis is carried out by sintering at 1200 Â° C. for 16 hours. The geometric density of syenite nepheline RbAlSi2O6 is 1.536 g / cm3. It is denser than that of Rb0.5Cs0.5AlSi2O6, which is 1.487 g / cm3. The density of Archimedes is 2.716 and 2.877 g / cm3, for the materials RbAlSi2O6 and Cs0.5Rb0.5AlSi2O6, respectively. X-ray diffraction analysis identified the two minerals synthesized in a nepheline skeleton of tetragonal structure. The FTIR analysis highlights the functional groups appearing in ceramics RbAlSi2O6 and Cs0.5Rb0.5AlSi2O6, and confirms the similarity of composition of the ceramics studied. The main chemical bonds identified in these materials are: : Si-O-Si, O-Si-O, Al-O-Si, Si-Al, O-Si-O-Metal, and Cs-O.

Keywords: *XRD, Sintering, Nepheline Syenite, FTIR.*

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MODIFICATION OF ALKALI- LIGNIN AS A CORROSION INHIBITOR OF CARBON STEEL API X52 IN 3.5% NACL, 0.3M HCL MEDIUM.

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ABSTRACT

A Kraft process of Lignin extraction has been used for extracting lignin.Black liquor from paper mills is made to produce energy or to throw in the environment, although it contains 25 to 30% of the fraction of wood that is lignin. Lignin is a three-dimensional, amorphous and phenolic polymer that differs according to the nature of the wood. In this work , the delignification process is performed at high temperatures and high pH values pH= 14- 13 and temperature around 170Â°C, After that, lignin can be isolated from the remaining alkaline solution by sulfuric acid mediated precipitation, which lower the pH to 5-7.5. The nitration of lignin is performed by using nitric acid with acetic acid. The sample obtained was characterized by spectroscopy (FI-TR), ultraviolet spectroscopy (UV). FI-IR and UV spectroscopy showed the presence of phenolic groups, NO2-groups, alcoholic functions and alkanic groups. The corrosion inhibitory effect of Nitrated Lignin on carbon steel in 3.5% NaCl medium at pH 1 was studied by potentiodynamic polarization, electrochemical impedance spectroscopy (NYQUIST and BODE) representation. The presence of smaller lignin fractions considerably reduces the corrosion rate of steel. Inhibition efficiency of lignin corrosion at 500 ppm (Kraft: 88%). The results of this corrosion test clearly show that lignin behaves as a mainly mixed and cathodic inhibitor. It was concluded that the inhibition process was spontaneous, the adsorption model followed the Langmuir model and that the inhibitor was mainly physically adsorbed (Î”G > - 40 KJ) to the surface of the carbon steel.

Keywords: *electrochemical impedance, inhibition efficiency, Nitration, carbon steel, potentiodynamic polarization, adsorption.*

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MODERN WASTE DISPOSAL AND RECYCLING CENTER OF TLEMCEN, HUMAN RESOURCES MOTIVATION STRATEGY

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ABSTRACT

These last years, the commune of Tlemcen (Algeria) dedicated a large part of the budget to the collection and transfer of household waste of the residents of the city, which is experiencing significant urban growth. For the recovery of products and the development of recycling of plastics and other materials, this center with an area of 2000 m2 will be of great contribution to the municipalities of Tlemcen, as well as private companies. The implementation of this process, sufficiently efficient to perform the treatment, depollution, recycling and recovery of garbage according to international standards, follows the instructions of the Wali of Tlemcen, to strengthen the technical burial of this center, by heat treatment equipment and gas treatment systems for the recovery of energy and heat . In addition, to reduce the impact on the environment and reduce the costs of this service provided by the garbage collectors, a new collection and transfer organization adapted to the scale of large urban centers has been set up. The purpose of this communication is to show the importance of the human resources motivation strategy in improving the performance of this company. Indeed, in modern state or private enterprises, different types of motivation are of paramount importance to encourage employees to take initiatives and participate effectively in the development of the institution .

Keywords: *technical burial., motivation, human resources, recycling, waste*

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SUSTAINABLE SCHOOL BUILDINGS: A DESIGN GUIDE FOR A HOT AND DRY CLIMATES

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ABSTRACT

In recent years, implementing sustainability principles in buildings, have gained great interest due to the global energy and environmental crises. In Algeria, buildings are a huge energy consumers, this consumption mainly goes toward providing indoor comfort, since most buildings are built following the same architectural typologies and with the same materials, with a standard typical design, that is to say, the existing school buildings stock reflects a low level of architectural quality and performance leading to a high consumption of energy and indoor discomfort. Schools are where the educational process takes place, thus it is important to create favorable environmental conditions to ensure a high quality of education. The city of Biskra, where a hot and dry climate prevails, faces thermal environment issues as hot solar radiation and exposure and long overheating period and high temperatures., thus in schools, it is difficult to achieve adequate thermal comfort without relying on mechanical systems, which increase the energy consumption. Since the sustainability level of a building is mainly depended on the architect's decisions during the design stages, this research presents a conceptual analytical framework aimed to develop a design guide for a bioclimatic sustainable school building design, this research analyses an exciting typical school building in Biskra and international innovative case studies projects, a qualitative method took place to evaluate the existing building indoor ambiances and the level of comfort and the energy use, using DesignBuilder software to perform numerical simulation. The results of the comparison between the case studies will introduce the best solution and design strategies for a sustainable school building design in a hot and dry climate context as a guide for future design conception..

Keywords: *Sustainable Design, Design Guide, School Building, Energy Efficiency, Comfort, Hot and Dry Environment*

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EFFECT OF THE OLIVE MILL WASTEWATER ON CORROSION BEHAVIOR OF CARBON STEEL

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ABSTRACT

Olive mill wastewater (OMW) is a major problem in the olive oil producing countries, because of its highly polluting power. Its physico-chemical characterization showed that this effluent has an acid character (pH = 4.9) and it is rich in organic and mineral matter (chemical and biological oxygen demand, polyphenols, chlorides, sulfates, nitrites, nitrates ...). In this work, the corrosion behavior of carbon steel (X70) immersed in olive mill wastewater sample solution, collected from an agro-industry, was studied. The obtained results show that the rate of corrosion increases because of the attack of acids exists in the OMW (Cl-, polyphenols, Ni, Fe). For two days of immersion, the potential stretches toward more positive values due to the oxidization of carbon steel. After the extension of the immersion until 7 days, we record the formation of the corrosion product on the surface of the working electrode. In the other hand, the analysis of surface samples by scanning electron microscope coupled with EDX confirm the formation of a layer obtained after corrosion process.

Keywords: *Olive mill wastewater, Corrosion, Environment, Pollution, Carbon steel.*

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ELABORATION AND CHARACTERIZATION OF FOAMS GLASS COMPOSITES FOR ELECTROMAGNETIC WAVES INSULATION APPLICATION.

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ABSTRACT

The protection of humans, animals and equipments against electromagnetic (EM) radiation requires the development of materials that have certain properties that lead to the attenuation of EM waves. Glass foam made from cullet (glass waste) is mainly used for thermal and acoustic insulation. The manufacture of these glass foams is not limited to the recovery of glass waste, but it contributes considerably to the protection of the environment. In recent years, some studies have shown that glass foams could also be used for the protection against pollution of EM waves. In the context of recycling wastes and protecting our environment from EM waves, glass foams loaded with graphite have been produced for absorbent applications. The composites were loaded with limestone (CaCO3) and graphite (between 0% and 2 wt%). These samples were characterized with an open ended coaxial probe Agilent 85070E connected to an Agilent 8510C vector network analyzer in the frequency range between 2 and 18 GHz. Results show a linear evolution of the dielectric properties (permittivity and dielectric losses) as a function of the percentage of graphite load and of the foams density. The best results obtained from permittivity and dielectric loss respectively are e'= 2.54 and tand= 0.3 at 10 GHz for the composite with a density of 0.63 g/cm3. Given the results obtained with our foams, the materials developed have excellent dielectric properties, which allow the manufacture of electromagnetic absorbers.

Keywords: *Dielectric properties, Foam glass, Electromagnetic, Graphite.*

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SEISMIC EARTH PRESSURE REDUCTION ON GRAVITY RETAINING WALLS USING RECYCLED TYRE CHIPS

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ABSTRACT

In this study considers the effect of tyre chips as compressible inclusion in reducing both the seismic earth pressures on a gravity type earth retaining wall. Tyre chips were placed as a compressible cushion between the wall and backfill. The 2-D finite element code PLAXIS was used for analysing the seismic response of retaining walls under earthquake loading. The validation of the proposed numerical model has been carried out using centrifuge test results already available in the literature. It is observed that the difference between seismic earth thrust and wall inertia into the system, which both affect the seismic design of these structures. The results of the analyses may be used as a guide for choosing the seismic earth thrust that needs to be taken into account in the design of the examined type of earth retaining walls.

Keywords: *Retaining walls, Lateral earth pressures, Compressible inclusion, Tyre chips, Finite element analysis*

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ELECTROCHEMICAL AND STRUCTURAL INVESTIGATION OF POROUS SILICON FOR HYDROGEN STORAGEÂ€

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ABSTRACT

In this work, we have prepared different types of porous silicon (PS) layers by electrochemical anodization .The characterization of elaborated layers by: SEM microscopy, FTIR spectrometry, SIMS spectrometry, contact angle, cyclic voltammetry, electrochemical spectroscopy (EIS) and charge / discharge galvanostatic. The SEM micrograph and FTIR spactra confirmed the formation of two types of porous silicon: nanoporous and mesoporous silicon.Hawever. The SIMS profiles at depth performed on PS layers before and after the hydrogen sorption show the increase of hydrogen concentration from 3.5x1020 atm / cm3 to 6.8x1021 atm / cm3 which confirms the sorption and the storage of H + ions in the anode (PS). The measured discharge capacity is of the order of 477 mAh /g with a coulompic efficiency of the order of 94% for the nanoporous silicon which confirms that this material is could be a promising candidate for the storage of hydrogen

Keywords: *electrochemical, storage, hydrogen, SIMS, mesoporous*

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COMPARAISON DES RESISTANCES MECANIQUES DES PÃ¢TES DE CIMENT AVEC DIFFERENTES SUBSTITUTION DE CENDRE DES MEDICAMENTS PERIMES Ã GRANULOMETRIE 80 ÂµM ET 40 ÂµM.

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ABSTRACT

L'utilisation de cendres volantes dans le béton est courante de nos jours, principalement en remplacement partiel du ciment. Cependant, la quantité actuellement utilisée dans beaucoup de pays n'est que de 15 à 25%. En Algérie, les cendres des médicaments périmés sont actuellement soit stockées sur les sites industriels ou évacuées vers les centres d'enfouissement techniques, et n'ont jamais fait l'objet d'une quelconque investigation dans le but d'une valorisation, contrairement à la cendre issue de la combustion du charbon actif. Ce présent travail a été fait pour un impact écologique en proposant une alternative à la mise en décharge des déchets industriels (qui présente de nombreux problèmes dont l'importance en coÃ»t et la place occupé par les sites de stockage) et d'autre part économique, compte tenu de tous les avantages que peut offrir la cendre volante. L'objectif de ce travail est de présenter le scénario de valorisation qui consiste à l'incorporation des cendres volantes issues de l'incinération des médicaments périmés (CVM) d'une entreprise Algérienne (certifiée iso 14001 et 9001) dans le cément. Les essais de résistance mécanique à la compression ont été réalisés sur des pâtes de ciment avec différentes substitution de cendre (0,10, 20,40 %) granulométrie 80µm et 40µm. Les résultats obtenus montrent que les résistances à la compression à 28 et 90 jours des éprouvettes contenant de la CVM 80µm sont inférieures aux résistances à la compression des éprouvettes de CVM 40µm, ce qui explique l'influence de la granulométrie sur la résistance mécanique.

Keywords: *: Incinération, Cendre volante, valorisation, essais mécaniques, Pouzzolane, granulométrie.*

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CONTRIBUTION A L'ATTENUATION DE LA POLLUTION METALLIQUE DU SOL DU AUX BOUES RESIDUAIRES EN ALGERIE

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ABSTRACT

La pollution des sols par les métaux lourds est devenue une problématique en Algérie, notamment celle dû au rejet des boues résiduaires issues des différentes stations d'épuration des eaux usées. Souvent ces boues sont rejetées sans traitement au préalable ce qui pose le risque de la contamination du sol et la nappe phréatique, ainsi que leurs introduction dans la chaine alimentaire (via les plantes) affectant ainsi la santé des êtres humains et des animaux. La phytoremédiation des contaminants présents dans les sols est une technologie émergeante mettant en jeu les différentes interactions entre la matrice contaminée et l'organisme végétal. A cet effet nous avons opté pour l'utilisation de cette méthode dans notre travail pour minimiser la pollution métallique d'un sol situé au voisinage de la STEP de Réghaia. Il a été observé en premier l'effet négatif de la pollution métallique sur les deux plantes testées (colza et luzerne) se traduisant par une croissance moindre (baisse de la hauteur et de la masse...). Néanmoins la culture de ces plantes a permis d'avoir des taux d'extraction appréciables qui ont été amélioré par l'ajout de substrat fertilisant (30-48%). En conclusion nous pouvons dire que les essais de phytoremédiation appliquées a permis d'avoir des rendements d'extraction des métaux lourds satisfaisants dans le cas de notre sol pollué.

Keywords: *phytoremédiation., métaux lourds, boues résiduaires, Pollution de sol*

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ETUDE DE L'EFFET DES PARAMETRES OPERATOIRES SUR LA DEGRADATION DU VERT BRILLANT PAR OXYDATION ANODIQUE

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ABSTRACT

La pollution des eaux par les composés organiques, vu leur nature récalcitrante, est devenue un problème de grande envergure. A cet effet, il devient primordial d'éliminer ces composés à l'aide de procédés efficaces tels que les procédés d'oxydation avancée. Aussi, dans cette étude, nous nous sommes intéressés à la dégradation d'un colorantÂ organique : le vert brillant, en utilisant l'oxydation électrochimique et ce, en mettant l'accent sur les différents paramètres opératoires qui influencent l'efficacité du procédé : le matériau anodique (BDD, Ti/Pt, Acier inoxydable), l'intensité du courant (0.05 - 0.4 A), la concentration initiale du vert brillant (5 - 100 mg/L), la concentration initiale en électrolyte (0.001 - 0.2 M), et enfin le pH initial de la solution (3 - 11). Les résultats obtenus ont révélé une décoloration totale du vert brillant, 100 mg/L, dans les conditions optimales.

Keywords: *oxydation électrochimique, BDD, Vert brillant*

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APPLICATION OF GEOSTATISTICAL APPROACH TO ROAD SAFETY EVALUATION IN RURAL ROADS: SENSITIVITY ANALYSIS AND DECISION SUPPORT TERRITORIAL.

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ABSTRACT

Road safety has now become a major concern in many countries. In Algeria, as elsewhere, many factors are involved in the phenomena of road accidents. The highlighting of their respective roles and of their interactions could contribute to the improvement of preventive measures. In the literature in the field, very different approaches are proposed to predict the road accidents and each treats the problem from a very specific perspective. In this field of research, our study aims to spatial identification along a road network the hazardous road segments which present a dangerousness index significant greater than the threshold value that is obtained from a normal distribution at the 95% confidence level. In this context, we proceeded the use of geostatistical approaches, in particular, global and local spatial statistics of Getis-Ord and Moran. The highlighting of these segments required the creation of a Geodatabase integrated in Geographic Information System (GIS).. About geoprocessing data in the geodatabase, the location of road accidents is defined relative to the hectometric points commonly called Basic Spatial Units (BSU). However, in an operational framework, these approaches are highly dependent on the hypothesis on the process of the measurement of the spatial proximity based on the distances between the BSUs. Thus, the interpretation of empirical results based on the optimal choice of the weighting structure and the critical distance. This process helped to set a value of proximity criterion adapted to the spatial structure of observed accidents. Methodologically, this work allowed to test several approaches to assess the safety levels experimented in the case of road network specifically high accidents risk in the Wilaya of Mascara. The first results confirm the validity of approaches, and which suggest the positive spatial autocorrelation and allow a recoverable mapping by managers in the choice of measures of preventive management.

Keywords: *Algeria., road Hazards, spatial autocorrelation, GIS, road safety*

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DOMESTIC SEWAGE TREATMENT OF ARID ENVIRONMENTS BY FILTERS PLANTED WITH SCIRPUS

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ABSTRACT

Dry areas suffer from a severe shortage of water resources, which has led to the search for an additional resource, which is the treatment of wastewater and its reuse in the industrial and agricultural sector. Due to the high cost of conventional systems, the search for alternative methods is inevitable: water treatment by planted filters is considered an acceptable solution for its many advantages, including its ease of realization, low cost and does not require skilled labour. The objective of our work is to demonstrate the capacity of a planted filter to treat Biskra's domestic wastewater, where the results obtained show a removal efficiency of 83.56% for COD, 86.24% for ammoniac nitrogen, 78.35% for phosphate and 83.33% for nitrites, which means a good capacity for treating domestic wastewater in arid environments with these filters.

Keywords: *wastewater, Scirpus, Filter planted, Dry areas*

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GEOTHERMAL POTENTIAL OF THE UNDERGROUND BUILDING AS A PASSIVE AND SUSTAINABLE ALTERNATIVE CONSTRUCTION FACING HOT-ARID CLIMATES

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ABSTRACT

This research aims to evaluate the energy conservation potential benefit of earth-shelter building. There are as many types of earth building methods as there are variations in soil, climatic, and cultural conditions. As an alternative to energy consumption in upper-ground building, the underground building was and still one of the oldest building morphology models as a thermal issue's solution especially in hot and arid regions. This paper aims to assess the thermal environment of an old underground building in â€œBitamâ€ • a hot-arid region in Algeria. In order to evaluate the thermal environment assessment of underground buildings, In order to extract the thermal potential, an annual measurement campaigns were conducted for both summer and winter seasons using a digital multifunction monitoring instrumentation (LM/FI20) for the quantification of the thermal advantages and extract most of its bioclimatic value especially thermal environments. Thereafter, a simulation tool â€œDesignBuilderâ€ • will be used for different underground building scenarios for thermal issues. The important findings relate to a high thermal potential using beneficial soil temperature and a large amounts of earth isolation that protect the building envelope from insulation. The underground shelter seems able to face extreme seasonal climate changes and interacts in a systemic way to an adequate indoor thermal comfort.

Keywords: *DesignBuilder, site measurement, On, Thermal environment, Underground building, Hot and arid region.*

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CARACTERISATION DE LA BOUE DE LA STATION D'EPURATION DE BOUIRA

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ABSTRACT

L'eau consommée ou inévitablement des déchets. Les eaux usées sont découvertes et dirigées vers les stations d'épuration afin d'être purifiées avant leur réintroduction dans le milieu naturel. La majorité des eaux usées est en cours de traitement par les techniques biologiques. A la sortie de la station d'épuration, les eaux sont rejetées dans le milieu récepteur. Les matières en suspension, récupérées sous formes de boues, sont traitées, valorisées et / ou éliminées. Less-on-the-Phas-and-Mineral-Is-Is-In-Minute-Interstitiel-Is-Is-Is-and-the-Great-Level-Positive Il est donc nécessaire de procéder à un traitement avant le rejet dans l'environnement. Le traitement de la boue consiste essentiellement en une stabilisation afin de bloquer toute activité biologique. L'objectif principal de notre travail est basé sur le traitement de la dégradation de la matière organique. Nous sommes intéressés Ã analyser les paramètres tels que la siccité de la boue, la perte du feu, la matière sèche, les matières en suspension et les métaux lourds. La teneur non négligeable de la matière organique a été absorbée par une combustion, mais elle a également été réduite. Les concentrations en métaux lourds dans les boues restent inférieures à la norme Algérienne NA 17671.

Keywords: *matière organique, boue, Station d'épuration, analyses.*

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THE USE OF LOCAL BIOMASS TO DEVELOP NEW INSULATING MATERIALS WITH GOOD MECHANICAL PROPERTIES

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ABSTRACT

Date palm residues are renewable and available in abundance while they remain discarded as agricultural waste with no economical utilization values. Several investigations have been carried out on the valorization of this natural resource in different domains. Petiole, Rachis, Fibrillium, Leaflets were the palm tree residues the most studied as composites reinforcement. This work reports the results of an experimental investigation on mechanical and thermal properties of these four residues of date palm tree in order to optimize their performances when used as reinforcement. The local natural resources used in this study are the date palm fibers from Biskra oasis in Algeria. The results have shown that there is no significant difference in the morphological proprieties of the four types of residues. It is seen that the Rachis and leaflets exhibit a high tensile strength and young modulus values compared to the other residue. On the other hand the low value of bulk density of Petiole and Fibrillium leads to high value of specific tensile strength and young modulus. It was found that the specific young modulus of Petiole and Fibrillium was higher than that of Rachis and Leaflets and that of other natural fibers or even artificial fibers.

Keywords: *date palm wood, natural reinforcements, Composite materials, wood particleboards.*

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RHEOLOGICAL PROPERTIES OF CONCRETE MADE WITH DRIED AND PRE-SATURATED RECYCLED CONCRETE AGGREGATES.

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ABSTRACT

This paper evaluates the influence of pre-saturation and dried recycled concrete aggregates (RCA) on mechanical and rheological properties of concrete. For all concrete mixes, coarse ordinary aggregates (COA) are partially substituted with RCA and an amount of superplasticizer was added to keep the same workability. The results found show that dried RCA aggregates are characterized by a great absorption which decrease the effective mixing water and cause a slight improvement in compressive strength regarding the control concrete. Also, an increase of the yield stress and the viscosity are observed in all concrete samples. However, when pre-saturated RCA aggregates are used, the compressive strength of the various concrete mixes is lower than that of concrete made with dried aggregates and the rheological parameters decrease as the replacement level of RCA aggregates exceeds a specific value. Mathematical relationships are proposed to express the variation of the rheological parameters according to the concrete composition with fair correlation coefficients.

Keywords: *compressive strength., yield stress, viscosity, pre, saturation, recycled concrete aggregate*

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SOLIDIFICATION/STABILISATION DES DECHETS DANGEREUX DE L'UNITE BCR PAR LE CIMENT ET LES CENDRES VOLANTES

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ABSTRACT

Cette étude porte sur la faisabilité de solidification/stabilisation des déchets dangereux de l'unité BCR, riches en métaux lourds (Ni2+, Pb2+ et Cr3+), par le ciment Portland et les cendres volantes. Pour ce faire, plusieurs mélanges de mortiers ont été préparés avec différents rapports déchet/ciment. Les cendres volantes ont été utilisées comme une addition minérale au ciment dont le pourcentage massique est de l'ordre de 10%. Les résistances mécaniques des mortiers confectionnés ont été évaluées Ã 7, 28 et 91 jours afin d'étudier l'influence de l'ajout du déchet sur la résistance à la compression des formulations étudiées. Les mortiers obtenus après solidification/stabilisation ont été soumis au test de toxicité TCLP après 28 jours de durcissement. Les lixiviats ont été analysés par la spectrophotométrie d'absorption atomique à flamme SAAF afin de déterminer la concentration des métaux lourds lixiviés. Les analyses DRX ont été utilisées pour identifier les nouvelles phases formées dans la structure des mortiers stabilisés/solidifiés. Les résultats de résistances mécaniques montrent que l'ajout du déchet diminue la résistance à la compression des mortiers confectionnés, ceci peut être attribué à la présence des métaux lourds qui ralentissent les réactions d'hydratation. Les résultats du test TCLP mettent en évidence l'efficacité du traitement de solidification/stabilisation en réduisant le potentiel polluant des déchets dangereux. Les résultats du test TCLP montrent que les mortiers à base de cendres volantes présentent une meilleure efficacité en termes de rétention des métaux lourds par rapport aux mortiers sains (sans l'ajout de cendres volantes), ceci est à l'effet pouzzolanique des cendres volantes qui contribue à la réduction de la porosité des mortiers et par conséquent le relargage des métaux lourds devient faible.

Keywords: *Cendres volantes, Solidification/Stabilisation, Déchets dangereux, Test TCLP.*

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ADSORPTION OF BASIC TEXTILE DYE ON AGRICULTURAL WASTE; CHARACTERIZATION, EQUILIBRIUM, KINETIC AND THERMODYNAMIC STUDIES.

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ABSTRACT

The present study aims to develop a low-cost, efficient and environment-friendly process by the use of an agricultural waste namely, sunflower seeds shells (SSS) to purify basic textile dye contaminated aqueous solutions. Fourier transform infrared (FTIR) and scanning electron microscopy (SEM) analyses werecompleted with the aim of determining the physical and chemical characteristics of the adsorbent. The effectiveness of Sunflower Seed Shells in adsorbing the Asucryl Red (AR), from aqueous solution has been studied as a function of contact time, initial dye concentration, adsorbent dosage, pH and temperature. The adsorption kinetics results are adjusted to best the pseudo-first-order, pseudo-second-order and intraparticular models. The experimental data are analyzed by Langmuir, Freundlich and Temkin isotherms, revealing that the maximum adsorption capacity of AR on this adsorbent 50.51 mg/g at T = 25 °C and pH= 8.0. The calculated thermodynamic data demonstrates that adsorption is spontaneous with a light variation of the rate adsorption during the temperature increase. The adsorption efficiency of the dye on this adsorbent can reach a removal rate of 92% at an equilibrium time of 120 min. This reveals that the adsorbent is both effective and economically viable.

Keywords: *Agricultural waste, adsorption, isotherm, kinetic and thermodynamic.*

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A SOLVENT-FREE SYNTHESIS OF COUMARINS USING HETEROPOLY ACIDS AS CATALYST

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ABSTRACT

Au cours des dernières décennies, les Hétéropolyanions (HPA), une classe de composés inorganiques bifonctionnels, ont beaucoup retenu l'attention en raison de leurs structures variables, de leurs textures et en particulier de leur forte acidité et de leur redox puissant. De plus, ce sont des catalyseurs écologiques sans danger pour l'environnement en ce qui concerne la corrosivité, la sécurité, la quantité de déchets et la possibilité de les réutiliser. La synthèse de la coumarine et de ses dérivés a attiré beaucoup d'attention de la part des chimistes spécialisés dans les domaines de la chimie organique et de la médecine, car de nombreux produits naturels contiennent ce noyau hétérocyclique. Ils sont largement utilisés comme additifs dans les aliments, les parfums, les produits agrochimiques, les cosmétiques, les produits pharmaceutiques et les préparations d'insecticides, d'agents de blanchiment optique, de colorants laser dispersables fluorescents et accordables. La coumarine et ses dérivés ont des agents bioactifs variés tels qu'antimicrobiens, antithrombotiques, anticoagulants, activité antipsoriasique, anticancéreux, anti-VIH, activité antioxydante, activité antiproliférante, activité inhibitrice des protéases virales, effets analogues à l'œstrogène et activités modulatrices du système nerveux central. Les coumarines jouent également un rôle intermédiaire dans la synthèse des furocoumarines, des chromènes, des coumarones et des 2-acylrésorcinols. Dans ce travail, nous rapportons la synthèse de dérivés de la coumarine en utilisant le HPA comme catalyseur écologique efficace en effectuant la réaction avec 3 mmol de phénols et 2 mmol d'acétoacétate d'éthyl en présence d'une quantité catalytique de HPA. Les produits purifiés ont été déterminés aux points de fusion et caractérisés par des méthodes spectrales: FT-IR, RMN 1 H, RMN 13 C.

Keywords: *Coumarins., Pechmann, Heteropolyacid*

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EFFECT OF ULTRASOUND ON THE PURIFICATION OF LIQUID WASTE BY COAGULATION-FLOCCULATION PROCESS

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ABSTRACT

The main purpose of this research is the study of the influence of the ultrasounds on the treatment of seepage waters, specifically the leachates stemming from the Technical burying center of Souk-Ahras city, by coagulation-floculation process, thus to know the performance of the three coagulants, namely, ferric chloride FeCl3, aluminum sulphates Al2(SO4)3.18H2O, and ordinary alum KAl(SO4)2.12H2O, of the polluting load contained in these waters. Leachate samples were collected and analyzed during a limited duration, also physicochemical and biochemical analyses such as conductivity, turbidity, pH, refractive index, oxygen below, Biochemical oxygen demand (DBO5) and organic matter, were applied to this polluted water before and after treatment. The optimal conditions found are: a time exposure to the ultrasounds equal to 5 minutes for both aluminum sulphates and ordinary alum; a time exposure equal to 15 minutes for ferric chloride, a ratio of (volume coagulant / volume leachate) equal to 1 for a coagulant dose of 15 %. The best clarity was obtained by a treatment based on Fe Cl3, resulting a turbidity of the order of 1.07 NTU. The effect of the temperature of the ultrasounds bath was also approached, a temperature of 20°C was found better for the clarification of waters of infiltration by coagulation-floculation process.

Keywords: *Coagulants, technical Landfill, Physicochemical and biochemical analyses., Seepage waters, Ultrasounds, Leachates*

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CELLULE SOLAIRE A GAP GRADUEL EN COUCHES MINCES A BASE DE CZTS PAR SCAPS

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ABSTRACT

Bien que la technologie photovoltaïque en couches minces dans sa filière CuIn1-xGaxSe2 (CIGS) offre un rendement intéressant de 22.6%, elle ne permet pas de répondre aux besoins énergétiques suite aux limites de matière première (indium) qui freinent le développement de cette filière. Le Cu2ZnSn(S1-ySey)4 (CZTSSe) semble être un matériau de choix puisqu'il est fait d'éléments abondants et non toxiques. Le meilleur rendement obtenu par des cellules solaires à base de CZTSSe est de 12.6%. Cependant, il reste encore loin du rendement théorique estimé à 32 %. L'une des méthodes prometteuse pour l'amélioration du rendement consiste à utiliser des cellules solaires à composition graduelle. Dans ce travail, nous avons étudié l'effet du gradient de composition sur les performances de la cellule solaire de type ZnO:Al/n-CdS/p-Cu2ZnSn(S1-ySey)4/Mo (y= 1 ~0). Cette étude a été faite par simulation numérique à l'aide du logiciel SCAPS-1D. Notre simulation est effectuée sur deux types de cellules : la première concerne les cellules uniformes à base de CZTS et CZTSe. La deuxième consiste à simuler la cellule à composition graduelle afin de visualiser l'effet de la teneur en sélénium sur le comportement des cellules. Les rendements obtenus par les cellules uniformes à base de CZTS et de CZTSe sont de 8.46% et 10.44%, respectivement. Cette limitation de rendement est due aux faibles valeurs de tensions de circuit ouvert qui sont de 538 mV et 541 mV. Par contre, pour la cellule à composition graduelle (CZTSSe), un rendement de 14.31% a été obtenu. Cela est associé à l'amélioration de la tension de circuit ouvert (595 mV) et un courant de court-circuit de 35.65 mA/cm 2. Le facteur de forme est de l'ordre de 67.39%. Les résultats obtenus par SCAPS-1D sont en accord avec ceux publiés.

Keywords: *SCAPS1D, composition graduelle, Cellules solaires, CZTS, CZTSe.*

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ELECTRODYNAMICS EDDY CURRENT SEPARATION OF WASTE

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ABSTRACT

The electrodynamics eddy current separator is used for sorting powder and small particles of conductive materials from wastes by using a variable frequency electromagnet. This separator is characterized by coil excited with an alternating current and ferrite core with an air-gap. The aim of numeric simulation of electromagnet separator with finite element method permitted the evaluation of magnetic and mechanical characteristics of separation. The results show the magnetic flux density, magnetic force and eddy current in aluminum circular particles with different sizes at excitation resonance frequencies placed in a time varying magnetic field is presented in this paper. These results help to increase the separation force and the recovery rate of recycling materials with high purity.

Keywords: *waste particle, varying magnetic field, time, powder., eddy current*

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DURABILITY OF RECYCLED CONCRETE USING COARSE CRUSHED CONCRETE AGGREGATES

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ABSTRACT

This investigation aims to determine the inï¬‚uence of recycled concrete aggregates (RCA) on durability of concrete. For all concrete mixes, Coarse ordinary aggregates (COA) are partially (20, 40, 60, 80 and 100%) substituted with RCA and a quantity of superplasticizer was added to keep the same workability. The results found show that concretes with RCA aggregates requires a great dosage of superplasticizer and indicate that recycled concrete mix having the highest water absorption and water permeably corresponds always to the mix with the highest shrinkage, that of concrete made with 100% Coarse ordinary aggregates. For low W/C ratios (W/C=0.4), the presence of recycled aggregates decreases considerably the drying shrinkage. However, the drying shrinkage of concrete made with recycled aggregates is important with high W/C ratios (W/C=0.6) and in a proportional way to the substitution rate. Mathematical relationships are proposed to express the variation of drying shrinkage according to the concrete composition with fair correlation coefficients.

Keywords: *durability, superplasticizer, workability, Recycled concrete aggregates, drying shrinkage.*

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SYNTHESIS AND SURFACTANT PROPERTIES OF XYLOSE PALMITATE, A BIOSURFACTANT.

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ABSTRACT

Biosurfactants from renewable resources can surpass synthetic surfactants from petroleum in terms of biodegradability, biocompatibility and sustainability. Sugar Fatty Acid Esters (SFAE) are nonionic biosurfactants that can be synthesized by enzymatic or chemical route. These amphiphilic molecules are biodegradable, non-toxic and possess physicochemical properties, which allow their application in various fields such as detergency and cosmetics. In the medical and therapeutic field these biomolecules represent excellent antibacterial, antifungal and antiviral agents. In this work, we optimized the synthesis of xylose palmitate ester by the enzymatic pathway. Critical micellar concentration (CMC) and surface tension value (Î³CMC) of this amphiphilic compound were determined. Table 1 summarizes the physico-chemical parameters of the synthetized compound. The low value of the interfacial tension indicates the ability of using this surfactant in several applications. It can act asÂ an emulsifier that will allow a compound that is normally insoluble to dissolve. Furthermore, the micelle packing parameter is close to 1 and it related to rodlike micelle of the adsorbed surfactant molecules.

Keywords: *surface tension., CMC, HLB, Biosurfactant*

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TiO_2 AND ZNO PHOTOCATALYSIS OF CR(VI) FROM PHOTOVOLTAIC WASTEWATER

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ABSTRACT

The objective of this study is the use of two photocatalysts based on metal oxides which are: titanium dioxide (TiO2) and zinc oxide (ZnO) to reduce hexavalent chromium Cr(VI) which is a photovoltaic industry pollutant to trivalent chromium Cr(III) in the UV field. The effects of various parameters such as pH, the amount of the catalyst, the concentration of the pollutant and the hydrogen peroxide (H2O2) are discussed. As a final test, we used sunlight instead of the UV lamp. It was found that the catalytic process exhibited the highest photocatalytic activity using TiO2 anatase than ZnO under the same operating conditions, so the reduction rates are higher with titanium oxide than with zinc oxide. For TiO2 the optimum dose of the photocatalyst is 0.5 mg L− 1 at pH 1, the concentration of Cr(VI) 1.0 mg L− 1 and the rate of the H2O2 is 0.15% (V/V). For ZnO the optimum dose of the photocatalyst is 0.8 mg L− 1 at pH 4, the concentration of Cr(VI) 1.0 mg L− 1. The comparison of the process under the optimal conditions of UV light and sunlight the removal rates in case of titanium oxide are 52,51% and 9,63% respectively, in case of zinc oxide are 26,51% and 2,10%.

Keywords: *ZnO, TiO2, photocatalysis, water, waste, hexavalent chromium*

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MESOPOROUS SILICA SUPPORTED AMINE AND AMINE-COPPER COMPLEX FOR CO2 ADSORPTION: DETAILED REACTION MECHANISM OF HYDROPHILIC CHARACTER AND CO2 RETENTION

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ABSTRACT

Mesoporous silica SBA-15 was functionalized with various amines and then doped with copper II cation (Cu2þ). The modified materials were tested for the retention of CO2 at room temperature using temperature-programmed desorption (CO2-TPD). Several parameters affecting the CO2 retention capacity (CRC) such as the nature of amine groups, repetitive adsorption-desorption cycles and dispersion of copper were investigated. CO2-TPD and H2O-TPD allowed correlating the hydrophilic character with the CO2 retention capacity. The obtained results showed that amine-functionalized mesoporous materials containing their own moisture exhibit higher effectiveness in the retention of CO2. Triaminefunctionalized SBA-15 displayed the highest CRC value as a result of the increase of the number of adsorption sites. Material reuse in three adsorption/desorption cycles revealed high stability with a slight decrease in CRC. The dispersion of copper induced a progressive decrease in the CRC value. The CRC decreased with increasing Cu2þ content due to competitive complexation of Cu2þ by the amino groups.

Keywords: *programmed desorption, 15, Temperature, Carbon dioxide, Amine functionnalized SBA, Mesoporous silica, Hydrophilic character*

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ETUDE DE LA BIOSORPTION DU ROUGE CONGO SUR LA POUDRE DES FEUILLES DE PALMIER

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ABSTRACT

La pollution des eaux provenant des effluents industriels chargées en colorants est un sérieux problème dans plusieurs pays. Cette pollution peut provoquer des effets nocifs sur l'environnement et sur la santé humaine. Plusieurs procédés physico-chimiques, notamment l'adsorption, sont mis en œuvre pour le traitement de ces eaux, afin d'éliminer les effets néfastes de ces polluants organiques sur l'environnement. Dans cette étude, les feuilles de palmier sont utilisées pour éliminer le colorant rouge Congo en milieux aqueux. Les expériences d'adsorption sont réalisées en mode batch. Les paramètres examinés sont : le pH initial de la solution aqueuse, le temps de contact, la concentration initiale en colorant, la masse de l'adsorbant et la température. Les résultats obtenus montrent que le rendement d'adsorption du colorant augmente avec la dose de l'adsorbant et la température mais diminue avec l'augmentation du pH initial de la solution et de la concentration initiale en colorant. Le maximum de rétention du colorant par le biosorbant est atteint au bout de 90 minutes de contact.

Keywords: *environnement, biosorption, feuilles de palmier, rouge Congo, pollution*

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VALORISATION DES SEDIMENTS DE DRAGAGE EN TECHNIQUE ROUTIERE, CAS DU BARRAGE DE KHERRATA A BEJAIA AU NORD D'ALGERIE

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ABSTRACT

La gestion des quantités importantes de sédiments de dragage constitue un enjeu environnemental et économique de taille. Afin de valoriser ce matériau, qui initialement était soit stocké ou rejeté en mer, nous avons réalisé une étude paramétrique approfondie qui a pour objectif d'utiliser les sédiments de dragage dans le domaine routier. Cette étude a comme double avantage, d'une part de rentabiliser l'opération de dragage qui s'avère très onéreuse et d'avoir à disposition une grande quantité de matériaux de construction. Après une première étape de caractérisation physique et mécanique il en ressort un mauvais comportement mécanique compromettant alors leur valorisation. En effet Cette pré-étude montre qu'en l'état les sédiments ne peuvent Ãªtre utilisés pour les structures de chaussées, par exemple, car le comportement physique et mécanique du matériau ne répond pas aux critères imposés par les réglementations en vigueur. Il est donc nécessaire d'améliorer les caractéristiques physiques et mécaniques des sédiments naturels. C'est pour cela quand dans un second temps nous étudierons l'impact d'un traitement à base de ciment seul ou avec des additifs tels que les fines de carrière pour permettre de stabiliser ces sédiments et d'obtenir de meilleures caractéristiques physiques et mécaniques. Différentes formulations sont proposées afin de répondre aux exigences réglementaires. En faisant varier le taux de ciment il est possible d'améliorer de façon substantielle les propriétés mécaniques des sédiments de dragage. L'association d'une poudre de carrière aux mélanges s'avère intéressant à travers les résultats obtenus. Une synthèse des caractéristiques mécaniques obtenues est proposée. Le matériau traité est désormais conforme aux normes et aux classifications exigées en technique routière à partir de 2% de ciment.

Keywords: *techniques routières, stabilisation, valorisation, Sédiments dragués, sédiments traité.*

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TREATMENT OF URANYL LIQUID WASTE BY SILICO-ALUMINOPHOSPHATES MATERIALS

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ABSTRACT

Adsorption of uranium ions from nuclear effluents onto silico_aluminophophate sieves materials is carried out in this study. The silico_aluminophosphate are synthesized by hydrothermal crystallization at 473 K using tripropylamine as structure directing template. The synthesized materials are characterized using powder X-ray diffraction (XRD), nitrogen adsorption surface analyzer, scanning electron microscopy (SEM), and X-ray fluorescence spectroscopy (XRF). The as-prepared materials are then assessed as the adsorbent for uranium (VI) from synthetic solutions and nuclear effluents. The batch experimental studies are carried out to evaluate the effect of the initial uranium concentration, pH, contact time, solid to liquid ratio and temperature. Pseudo-first and pseudo-second order kinetic models are used to test the experimental rate data. Thermodynamic parameters namely the enthalpy (ΔH), entropy (ΔS) and free energy (ΔG), for each sorption process are calculated. The obtained optimal parameters are applied to radioactive effluents containing uranium ions with different activities obtained from Nuclear Research Center of Draria, Algeria.. The collected results indicated that silico-aluminophosphates are highly effective materials for the removal of uranium (VI) ions from nuclear effluents.

Keywords: *radioactive effluents, uranium adsorption, materials, kinetics, decontamination factor*

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VALORISATION D'UN DECHET AGROALIMENTAIRE POUR L'ELIMINATION DU COLORANT AG25

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ABSTRACT

La valorisation des déchets peut être considérée comme une solution préférable à la mise en décharge, elle est définie comme un mode de traitement qui consiste dans "le réemploi, recyclage, ou toute autre action visant à obtenir, à partir des déchets, des matériaux réutilisables ou de l'énergie ". En plus des différentes voies de valorisation des déchets (matière et énergie), il y'a possibilité de les réutiliser en leur faisant subir une transformation physique, chimique, biologique ou thermique. C'est dans ce contexte que s'inscrit ce travail. Il s'agit en la préparation de charbons actifs à partir d'un déchet agroalimentaire afin d'obtenir un produit applicable dans le traitement des eaux et particulièrement sur un polluant présent fréquemment dans les rejets issus des industries textiles qui est le green acid AG25. Dans notre travail, nous avons procédé à la préparation de différents charbons actifs à partir d'un déchet agroalimentaire et nous les avons appliqués dans le traitement des eaux contaminées par l'AG25, présent fréquemment dans les rejets des industries textiles. Les charbons actifs ont été préparés par activité thermique (200, 400 et 600°C) et thermochimique (H3PO4 et à 450°C). Les caractérisations ont été réalisées par microscopie électronique à balayage(MEB), diffraction des rayons X, infrarouge à transformée de Fourier (IRTF), BraunauerEmett et Teller (BET), ainsi que les indices d'iode et de méthylène. L'étude par adsorption a été effectuée en fonction du pH, de la concentration du polluant, du temps de contact et de la température. L'élimination de l'AG25 a été suivie par spectrophotométrie UV à 643nm. Le charbon activé thermochimiquement a donné les meilleurs taux d'élimination de l'AG25 de l'ordre de 95%. Enfin, nous avons reproduit les données expérimentales obtenues par spectrophotométrie, en simulant les équations de différentes isothermes par des relations linéaires.

Keywords: *déchet agro, adsorption, valorisation, alimentaire, AG25, charbon actif.*

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PREDICTION OF URBAN AIR QUALITY (VOCS) USING ANSYS SIMULATION METHOD

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ABSTRACT

Indoor-outdoor environments are polluted with volatile organic compounds (VOCs), mainly benzene, toluene, ethylbenzene and the three ortho-, meta- and para-xylene isomers, commonly known as BTEX. Motor vehicles are the main source of these compounds. In this regard, we propose to study the simulation of the dispersion of benzene emitted by the exhaust gases of a vehicle in order to predict the different physical dispersion parameters as a function of the distance of the emission source with respect to the location of the study, the diameter of the exhaust gases and the height of the buildings. In our work, CFD simulations were carried out using the turbulence model k-Îµ provided by the commercial code ANSYS-CFX. The results showed that whenever the source of pollution approaches the urban environment, pollution is still high in urban areas, which affects the well-being of the population.

Keywords: *ANSYS CFX., exhaust gas, dispersion, simulation, Benzene*

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HYDROCHEMICAL CHARACTERISTICS OF THE WATERS OF THE WATERSHED OF TIZIOUZOU

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ABSTRACT

Water demand is still increasing due to population growth and higher standard of living. A several water resources are available in Algeria. Infortunatly majority of these ressources are not quantified. The physicochemical analysis of water ressources can play a very important role in future water management and prospective sustainable living in Algeria. In this work, special attention is given to the source waters of the TiziOuzou region. The objective of this work is to contribute of water quantification from recovered sources at different sites. The characterization of these sources allowed us to evaluate quantitatively and qualitatively the quality of waters in the region..Hydrochemical and statistical method were used for chemical analysis. The analysis of the samples have concerned the physical and chemical parameters such as pH, temperature, conductivity and Ca2+ , Mg2+ , Na+, K+, SO42-, NO3-, NO2-, Cl-and PO43- ions. The use of the Piper and Stabler diagram, the correlation matrix and the statistical analysis of the data by the PCA made it possible to carry out a hydrochemical study of these source waters and to know their chemical facies and to classify them . Statistical analysis of the data allowed us to note that a significant correlation existed between certain parameters and also to identify the distribution of the mineralization of these waters. The various analysis carried out on samples of water from the region have revealed the behavior of some parameters describing the physicochemical water quality. Descriptive analysis of physical and chemical parameters showed that the main elements measured in groundwater in this region for the different sampling stations indicate a difference in concentration between the different measuring stations. Analyses are performed by UV-Visible spectrophotometry, flame spectrophotometry and atomic absorption.

Keywords: *chemical parameters, physical, water analysis, Groundwater, piper diagram, PCA*

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EFFECT OF THE THICKNESS OF POROUS MEDIUM ON HEAT AND MASS TRANSFER NATURAL CONVECTION IN HORIZONTAL PARTIALLY POROUS ENCLOSURE

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ABSTRACT

Natural convection driven flow due to simultaneous temperature and concentration gradients is generally referred to double diffusive or thermosolutal convection. The study of thermosolutal convection in saturated porous media takes place more and more important due to the considerable challenge that it represents in new problems related to competition effects of heat and mass. The importance of porous media in the industrial and technological phenomena and processes is now well established. However, despite the rise of ways to study, gaps still exist in terms of basic knowledge, especially understanding the phenomena of heat transfer and mass transfer in systems include porous media. Therefore, studies of flow through porous medium have attracted considerable research attention in recent years because of their several important applications notably in the flow through packed beds, chemical process, food industry, filtration processes, oceanography, geophysics, drying technologies, petrochemical process, chemical transport in packed-bed Reactors, geothermal exploitation, thermal insulation, moisture transport, grain storage, dispersion of chemical contaminations in soil, storage of nuclear waste, solar collectors with a porous absorber, thermal energy storage system ,underground disposal of radioactive waste, gas storage and some agricultural products. For this purpose, many very intense research activities over the past decades, has been done on modelling the phenomenon of double diffusive convection in porous media.

Keywords: *Heat and Mass Transfer, Porous Medium, Thickness, Natural Convection*

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USE OF NATURAL STONES AS BUILDING MATERIALS FOR THE ARCHITECTURAL AND SUSTAINABLE DEVELOPMENT OF CITIES - HISTORICAL AND CONTEMPORARY EXAMPLES IN ALGERIA

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ABSTRACT

The type of dwelling of societies has always been linked to the geological landscape of the regions where they live. This story of "living and building" is well anchored in memories, and has become, over time, nostalgic and cultural. Therefore, the consideration of the geological landscape, and the integration of its resources (natural building materials) in the design strategy of the built environment allow his refinement. The historical and cultural values of the stone can make the urban space more livable, and even support the development of its touristic infrastructure. This study is first and foremost an essay which presents, through the ancient and contemporary history of Algeria, examples of the use of the geological resource in construction. This use is very diversified considering the great natural wealth of Algeria. This study also suggests an approach of identification and characterization as far as the stones used in these old constructions are concerned. Thus, petrographic analyzes and physicomechanical tests are carried out on samples of these rocks. Finally, an inventory of the used stones is established, which is very useful for specific studies, as for the design of an architectural landscape of cities related to their natural settings, or even for restoration and / or rehabilitation projects of historical monuments built with natural stones

Keywords: *geology, sustainable architecture, Natural building materials, geoetchnics*

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USING CRT GLASS AS FINE AGGREGATES TO IMPROVE THE DURABILITY OF SELF- COMPACTING MORTAR PREPARED WITH METAKAOLIN POWDER

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ABSTRACT

The field of civil engineering as another sector in the world has leaned towards sustainable development by ensuring the environment side as it became an important goal. This strategy is achieved through various options such as recycling and reuse of polluted industrial sites, materials, waste or by-products or industrial residues. This paper describes a study to explore the use of recycling waste glass obtained from crushed cathode rays tubes as fine aggregate, and metakaolin (MK), as a partial replacement of Ordinary Portland cement (OPC), for the development the durability of eco-self-compacting mortar (ESCM). Such as resistance to high temperature and water absorption. Here, OPC is replaced by 5, 10, and 15% of MK by weight of cement, and fine aggregate is replaced by 0, 10, 20, 30, 40 and 50% of CRT. These experiments indicate that using CRT glass with MK has been improved the water absorption and resistance to high temperature by 10% and 15% of the MK group respectively, for SCM made with CRT glass.

Keywords: *CRT glass waste, metakaolin, eco, self, compacting mortar, Resistance to high temperature, water absorption*

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MODELISATION D'UNE ELECTRODE EN SOUFRE, COMPOSITE (SOUFRE/CARBONE), POUR L'ADSORPTION CHIMIQUE DE PLOMB CATIONIQUE

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ABSTRACT

Dans cet article, nous comptons présenter une modélisation d'une électrode de type composite soufre/carbone mélangés mécaniquement à partir de soufre et noir de carbone en poudre, nos essais sur une nouvelle technique pour adsorbé le plomb cationique des eaux en employant une électrode composite (soufre/carbone) Il est connu que le soufre pratiquement insoluble dans les eaux, et il confie une caractéristique très importante, qui est la très rapide d'adsorption chimique de la plus part des métaux lourds tels que le plomb cationique, lorsque l'électrode incorporé en carbone est chargé négativement d'un courant, même de très faible intensité.

Keywords: *conductivité. traitement des eaux, électrode, désorption, métaux lourd, Adsorption*

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SUSTAINABLE MANAGEMENT OF RENEWABLE ENERGY POTENTIAL IN THE NAĀMA REGION

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ABSTRACT

The region of Naâma is a vast territory rich in renewable energy resources like other wilayas in Algeria. Renewable energy resources are those whose natural sources are almost inexhaustible. They are available in large quantities subject to the means to exploit them as: Biofuel (wood), wind (wind), solar photovoltaic and thermal (Sun), hydropower (water), bioenergy or biochemistry (plant and animal) and soils.The objective is to propose an approach for the rational management of renewable resources for optimal exploitation, which could adapt more appropriately to the socio-economic and ecological characteristics of the NaÃ¢ma region. The region of Naâma is rich in renewable energies in solar energy compared to the potentialities that exist. A large pilot solar station with an area of 15 hectares operating with solar energy is carried out on the territory the department of Naâma. This station is equipped with photovoltaic panels that will provide about 30% of its electricity needs. Several solar kits distributed for rural dwellings and kheimas in remote areas of livestock farmers located in scattered areas across the twelve communes that account the department to improve the living conditions of these populations. These kits will be used by agro-pastoralists for water pumping, drinking water supply, irrigation and water troughs in the large steppe areas of the region. These renewable resources demonstrate socioeconomic and environmental efficiency. Therefore, it is necessary to exploit rationally in order not to run out, while allowing the resource to rebuild itself in order to sustainably maintain their very important ecological and socioeconomic role for future generations.

Keywords: *management, renewable, resources, Naama, using*

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EFFECTS OF SO2 DEPOLARIZED ELECTROLYSER OPERATING PARAMETERS ON SIZING SYSTEM FOR HYDROGEN PRODUCTION

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ABSTRACT

Great increasing interest in both commercial community and research on the production of hydrogen in the energy sector as an energy carrier. The aim of these energy sources have to be renewable and sustainable to avoid any energy shortage and depletion. To solve the problem of pollution and environment degradation, they must also be clean. The Westinghouse Corporation proposed a new method known as the Hybrid Sulphur (HyS) cycle which forms part of the so-called thermo-chemical cycles. Two parts in this system are used to complete the functionality of this process : thermochemical and electrochemical reactions. In the second sub-reaction, several parameters can affect the electrochemical reaction and electrolysis efficiency such us : cell temperature, membrane thickness and catalyst loading ...etc. However, possibility to couple directly between photovoltaic system (PV) and SO2 depolarized electrolysis (SDE). The objective is to test several combinations of the series/parallel number of SDE electrolyser cells with maximize the power transfer produced by PV system to SDE electrolyser. This study will focus on both the influence of the electrolyser parameters on sizing system for hydrogen production and the global annual loss (GAL) for the whole system. Increase in cell temperature and decrease in membrane thickness improve the GAL.

Keywords: *Solar hydrogen production, electrochemical., Photovoltaic system, Efficiency Improvement, Direct Coupling System*

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IDENTIFICATION OF WINDY SITES OVER THE REGION OF HASSI R'MEL ALGERIA

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ABSTRACT

The present work deals with the wind potential assessment over the region of Hassi R'mel, as well as the investigation of windy sites for the wind farms implementation. The general methodology used in this paper is as follows. First, recent data stretching from January 1999 to December 2015 as provided by Algeria's Office of Meteorology (N.O.M) are used to describe the important wind potential in the region of Hassi R'mel. Based on this data, the statistical properties have been evaluated via wind histograms and wind rose. A weather monitoring system have been installed in the studied region (which is characterized by a complex hilly terrain) in order to have multiple measurement points that will be used to characterize this area in terms of the energy production and cost. Finally, a cost analysis of energy has been conducted. Throughout this study, it was found that the region of Hassi R'mel has a significant wind potential, and wind direction at Hassi R'mel is deflected by 45° compared with the sites at Telghemt and Hassi-Delaa. The low cost of energy of 0.09 $/kWh, is occurred for the site of Telghemt during the spring season.

Keywords: *energy, investigation, Hassi R'mel, Wind potential, cost*

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EFFECT OF PROTON IRRADIATION FLUENCE ON THE PERFORMANCE OF THE ALXGA1-XAS/GAAS P+NN+ SOLAR CELL

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ABSTRACT

Energetic particles such as electrons and protons induce severe degradation on the performance of solar cells used to power satellites and space vehicles. This degradation is usually attributed to lattice damage in the active region of the solar cell. In this work numerical simulator SCAPS is used to model the effect of 1 MeV proton irradiation on the performance degradation of p+-n-n+ GaAs solar cell. The effect is predicted by the calculation of the current-voltage characteristics under AM0 illumination for a constant dose of proton irradiation. From these characteristics the following solar cell output parameters: the short circuit current density Jsc, the open circuit voltage Voc, the fill factor FF and the conversion efficiency Î· are extracted. Simulating the effect of deep and less deep trap levels helps to find out which of them is responsible for the degradation of particular output parameter. The simulation results shown that the p+-n-n+GaAs solar cell is sensitive to 1013 cm-2 proton irradiation fluence. The deep electron traps are responsible for the degradation of the output parameters of the solar cell. The obtained results show that the decrease of the thickens of n+ GaAs collector improves the resistivity of the solar cell to proton irradiation.

Keywords: *degradation., proton irradiation, SCAPS, GaAs solar cell*

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VALORIZATION OF SAWDUST BY CHEMICAL ACTIVATION

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ABSTRACT

The use of sawdust as a filter medium or adsorbent in wastewater treatment requires a knowledge of the structure and texture of the material. The ability of sawdust to fix adsorbates such as pollutants can be greatly improved by chemical treatment. Modification of the wood can be made using chemicals such as H2SO4 or H3PO4 or by enzymes. The aim of this treatment is to activate the functional adsorption sites and thus increase the capacity of the material to be fixed with respect to the adsorbates to be eliminated. This objective can be achieved in several ways: by lowering the lignin and hemicellulose content of the solid substrate to be treated, increasing the porosity of the matrix, or increasing its specific surface area. Depending on the type of treatment, these actions can be combined. However, the main constraints of chemical treatment are to avoid loss or degradation of sugars and to limit the formation of inhibitor products. Wood-modifying techniques vary from one study to another, as well as the behavior of wood varies from one species to another. The control of the changes undergone by the material during the chemical treatment requires a good understanding of the evolution of its microstructure according to different stages of the chemical activation. In this context, and in view of the economic and environmental importance of wood sawdust upgrading in wastewater treatment, we first addressed the question of the effect of chemical modification on Microstructure of wood A mixture of red and hard wood, within the framework of the formulation of lignocellulosic adsorbent materials.

Keywords: *chemical activation, Wood sawdust, characterization*

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CHARACTERIZATION AND APPLICATION OF HALLOYSITE MODIFIED WITH CATIONIC SURFACTANT IN THE REMOVAL OF 2,4,6-TRICHLOROPHENOL : ADSORPTION, DESORPTION, AND REGENERATION STUDIES.

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ABSTRACT

The objective of this study is to synthesize an organoclay by mixing hexadecyltrimethylammonium bromide (HDTMABr) and halloysite. A solution of HDTMA-Br equivalent to six times the halloysite cation-exchange capacity was prepared and mixed for 14 days with this clay. The resulting organoclay was characterized by XRD, FTIR and TEM, and applied in the removal of 2,4,6- trichlorophenol (TriCP). The effects of pH, solution concentration, and temperature were examined. A particular attention has been focused on desorption and regeneration. Intercalation of HDTMA+ cations leads to an expansion of the basal distance from 7.3 to 26.0…, with an intercalation rate of 42%. FTIR analysis proves that the surfactant interacts with the inner surface hydroxyl groups. TriCP adsorption is maximum at pH 4 for the intercalated sample. The experimental isotherms are L-shaped and are well represented by the Freundlich equation. Adsorption affinity follows the sequence: intercalated halloysite > raw halloysite, with a maximum adsorbed amount of TriCP of 162.8 mg g-1, at 55 °C. The mechanism involved is hydrophobic interaction of the type: TriCP molecular form-organic fraction of the intercalated clay. The thermodynamic data highlight an endothermic and non-spontaneous process with the possibility of chemisorption. Understanding the interactions between the pollutant and organohalloysite is an essential approach to improving the use of these clays in sewage treatment.

Keywords: *trichlorophenol, Adsorption, Characterization, Intercalation, Halloysite, Mechanism.*

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FOR A VOLUNTARIST POLITICS OF SOLAR AND WIND DEVELOPMENT

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ABSTRACT

Algeria's energy is based on more than 95% of fossil resources. This energy is becoming more and more exhausted on one side and the demand on population growth on the other, so we have to find solutions to replace these non-renewable sources of energy. The objective of this day is to arrive at a 50% sustainable energy model based on solar and wind energy but also on sirghaz, CNG, energy saving, and exploitation of geothermal, biomass and micro hydraulics. For our part, we will present the state of the various forms of renewable energy based on a voluntaries policy of solar and wind development; we will propose scenarios to change the energy situation by 2030, which could get us out of the current situation.

Keywords: *Energy model 2030., Wind energy, Solar energy, Renewable energy*

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A REVIEW OF PHASE CHANGE MATERIALS USED TO IMPROVE THERMAL COMFORT IN BUILDINGS

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ABSTRACT

The integration of phase change materials (PCMs) into the buildings is a viable alternative to reduce energy consumption and improve thermal comfort within buildings (cooling or heating energy). The phase change materials are important because of their high thermal energy storage density and isothermal behavior during the phase change process (melting or solidification). This paper gives a state of the art review on the application of phase change materials in buildings, and discusses several aspects, such as the principal methods of integration of phase change materials during the building construction; the relationship between phase change materials and indoor thermal comfort; and the effects of the chemical and thermo-physical proprieties of PCM on the construction consistence. The results of this research showed that the paraffins, as phase change materials, are the most used with frequency of 87.5 %, and this is thanks to its transition temperature that varies from 19 ° C to 29 ° C and its latent heat of fusion that varies from 120 kJ / kg to 380 kJ/kg. The best observed effect of phase change material on indoor thermal comfort was a temperature reduction of 4.2 °C. Finlay, This study has important directive for the practical applications of phase change materials during building construction.

Keywords: *Melting temperature, Latent heat of fusion, Building construction, Phase change materials, Thermal comfort*

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INFLUENCE OF SOIL TYPE (M'SILA DISTRICT) ON LEGUMES CROPS; IRRIGATED WITH PURIFIED WATER FROM URBAN WASTEWATER TREATMENT PLANT

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ABSTRACT

Contamination of legumes with pollutants, especially heavy metals, is a major societal concern. This problem is global. These contaminations can be linked by water used for irrigation or soil pollution. The question of the transfer of these contaminants from the soil to the plants then appears paramount, as is the impact of the type of crop. Indeed, it may be relevant to ask whether it is appropriate to choose a plant of the root type or one whose leaves will be consumed, and especially according to the plants if the contamination affects indifferently or not the aerial parts and the roots. The transfer of pollutants, especially heavy metals, is one of the major public health concerns. The work done in this study is a direct reflection of this concern. The purpose of this thesis is to determine the impact of heavy metals from agricultural soils to the roots, then the aerial parts of (leguminous). Determine the total levels of heavy metals in soils and in the legumes studied The study presented here attempts to establish relations between the pollution of irrigation water and soils and the incorporation of these metals by consumer plants. The study focused on three agricultural sites in the Wilaya of M'Sila with the monitoring of the levels of cadmium, chromium and copper in pulses of high consumption.

Keywords: *transfer, heavy metals, legume, soil.*

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COMPARAISON DES RESISTANCES MECANIQUE DES PATES DE CIMENT AVEC DIFFERENTES SUBSTITUTION DE CENDRE DES MEDICAMENTS PERIMES A GRANULOMETRIE 80µM ET 40 µM

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ABSTRACT

L'utilisation de cendres volantes dans le béton est courante de nos jours, principalement en remplacement partiel du ciment. Cependant, la quantité actuellement utilisée dans beaucoup de pays n'est que de 15 à 25%. En Algérie, les cendres des médicaments périmés sont actuellement soit stockées sur les sites industriels ou évacuées vers les centres d'enfouissement techniques, et n'ont jamais fait l'objet d'une quelconque investigation dans le but d'une valorisation, contrairement à la cendre issue de la combustion du charbon actif. Ce présent travail a été fait pour un impact écologique en proposant une alternative à la mise en décharge des déchets industriels (qui présente de nombreux problèmes dont l'importance en coût et la place occupé par les sites de stockage) et d'autre part économique, compte tenu de tous les avantages que peut offrir la cendre volante. L'objectif de ce travail est de présenter le scénario de valorisation qui consiste à l'incorporation des cendres volantes issues de l'incinération des médicaments périmés (CVM) d'une entreprise Algérienne (certifiée iso 14001 et 9001) dans le cément. Les essais de résistance mécanique à la compression ont été réalisés sur des pâtes de ciment avec différentes substitution de cendre (0,10, 20,40 %) à granulométrie 80 µm et 40 µm. Les résultats obtenus montrent que les résistances à la compression à 28 et 90 jours des éprouvettes contenant de la CVM 80 µm sont inférieures aux résistances à la compression des éprouvettes de CVM 40 µm, ce qui explique l'influence de la granulométrie sur la résistance mécanique.

Keywords: *essais mécaniques, valorisation, Cendre volante, Incinération, Pouzzolane, granulométrie*

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ELIMINATION DU CHROME HEXAVALENT PAR LA POUDRE DES FEUILLES D'EUCALYPTUS : OPTIMISATION PAR LA METHODE TAGUCHI

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ABSTRACT

Le processus d'adsorption en batch des polluants métalliques en phase aqueuse peut être influencé par plusieurs paramètres comme le pH initial de la solution, la dose de l'adsorbant, la concentration de l'adsorbat, le temps de contact, la température, la vitesse d'agitation et les paramètres liés à l'état de l'adsorbat et de l'adsorbant. L'objectif de cette étude est d'appliquer l'approche statistique de Taguchi pour optimiser les paramètres du processus d'adsorption du Cr(VI) par la poudre des feuilles d'eucalyptus. La table orthogonale L9 a été appliquée pour déterminer les conditions optimales de l'adsorption. Les résultats obtenus montrent que l'élimination du Cr (VI) est maximale avec le niveau bas du pH initial de la solution (1.0) et de la concentration initiale en métal (50 mg/L) et, avec le niveau haut de la dose de l'adsorbant (3.0 g/L) et du temps de contact (70 min). L'analyse de variance des résultats expérimentaux, pour un risque de 5%, a révélé que le pH initial de la solution est le paramètre le plus influent sur le rendement d'adsorption du chrome (VI) avec un pourcentage de contribution de 47.60 %.

Keywords: *chrome (VI), adsorption, optimisation, méthode Taguchi, poudre des feuilles d'eucalyptus*

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PREVENTING INDUSTRIAL WASTES (PB, ZN) RELEASE TO THE ECOSYSTEM USING GEOPOLYMERS AS SUSTAINABLE MATERIALS

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ABSTRACT

Hundreds of tonnes of hazardous waste are released to the air, water, and land by industry every hour of every day. The chemical industry is the biggest source of such waste. Ten years ago less than 1% of commercial substances in use were classified as hazardous, but it is now clear that a much higher proportion of chemicals present a danger to human health or to the environment. Heavy metals for exemple are significant components of many industrial and residual wastes, and preventing their release into the ecosystem is of great interest.There are also many areas world wide where soils have become contaminated with heavy metals, and the treatment of these soils to prevent mobility of contaminants is becoming very essential. The immobilization of heavy metals must be durable and resistant against leaching. The studies showed that new materials called geopolymers can undergo aggressive conditions during several months without deterioration on the surface contrary to Porthland cement. The alkaline reaction during the geopolymers formation influence the density, limits the infiltration of the acid elements and sulfates in the gopolymer system and thus prevents potential degradation.

Keywords: *Industrial Wastes, Ecosystem, Green chemistry, Geopolymer.*

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SALTING EFFECT OF POTASSIUM CHLORIDE (KCL) ON THE RECOVERY OF ETHANOL FROM AQUEOUS SOLUTIONS

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ABSTRACT

The presence of a salt in a solution can influence the solubility of a compound by either increasing it or decreasing it, leading to Salting-in and Salting-out, respectively. In this work, effect of potasium chloride with different content (5%, 10% and 20%) on the liquid-liquid equilibrium data of (water+ ethanol+ ethyl acetate) system is investigated. The temperature was 293.15 K and the pressure was atmospheric. Solubility data were obtained using the cloud-point titration method. Refractive index measurement was employed to determine the concentration of all species in each phase. In addition, the reliability of the experimental tie-line data was checked by the Othmer-Tobias method. Finally, the distribution coefficients and separation factors have been measured in order to evaluate the effect of each concentration of the salt to extract acetic acid from water.

Keywords: *liquid equilibrium (LLE), liquid, Salting effect, ethanol, correlation*

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NUMERICAL ANALYSIS OF THE EFFECT OF REINFORCEMENT IN THE INCREASE OF THE BEARING CAPACITY OF THE SOIL.

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ABSTRACT

This paper study the bearing capacity of strip footings on a soil stratified. The upper layer, that the footing is placed on it, is sand and the bottom layer is soft clay with and without reinforcement. Using FLAC code are carried out to, consider of the effect of reinforcing the top layer with horizontal layers of geotextile reinforcement on the bearing capacity as well reinforcement effect of reinforced and unreinforced subsoil during the settlement of the foundation. The results indicate that the insertion of geotextile layers in the replaced sand not only sufficiently improves the footing performance but also leads to a significant reduction in the depth of the reinforced sand layer needed for reach the allowable settlement of the foundations superficial.

Keywords: *Reinforced soils, Strip footings, Layered soils, Bearing capacity, FLAC 2D*

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ASSESSING THE EFFECT OF HOSPITAL DESIGN ON INDOOR DAYLIGHT QUALITY IN PATIENT ROOM

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ABSTRACT

A good environment with natural light and noise reduction reduces the risk of errors and benefits the health of the patients. This basic fact should inspire the design of hospitals when it comes to the architecture.Hospital environments present special challenges where the city of Biskra needs intensive research to solve healthcare facility problems. The purpose of this study is to evaluate and analyze the indoor daylight quality in patient room in the both Hospitals of the city of Biskra (Bachir Ben Nacer hospital and Hakim saadan hospital). It conducts an investigative analyses associated with an evaluative approach for the daylight situation in patient rooms. Daylight conditions were assessed in the hospital site to investigate daylight quality and indoor ambiences. A patient room from the Pediatrics Ward in the hospital was selected. The study considered the following variables:the differences in daylight environments (illuminance, luminance level, and daylight factor), and the physical environment properties of patient rooms in the hospital. The study found that the access to daylight can positively affect human performance; good daylighting contributes immensely to the psychological and physical well-being of patients. Enhancing patient health should be integrated with all aspects of the design of sustainable hospitals that suit special conditions of desert locations.

Keywords: *Indoor environments, Daylight quality, Sustainable design, Patient room.*

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EFFECT OF WATER AND TEMPERATURE IN RHEOLOGICAL BEHAVIOR OF CRUDE OIL

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ABSTRACT

This work aims at studying the rheological of light crude oil emulsions properties (coming from the oil field of M'sila / south Algeria)by flow tests at different water concentrations of 10%, 20% and 30%; these emulsions were studied at two different temperatures (10 °C and 15 °C) in the range of shear rates from 0 to 700 S-1. The rheological tests relating to the viscosity-shear rate and shear stress-shear rate relationship, using the AR-2000 rheometer of TA instruments with a coaxial cylindrical geometry of quilt type. The results obtained show that the emulsions exhibit a non-Newtonian flow behavior with a low shear rate and a Newtonian behavior with a high shear rate. Addition, it was noted that the viscosity of the emulsion (W / O) was increased when the volume of water is increased and the temperature decreases, the non-Newtonian behavior was described by several models such as: the model of Power Law, the Herschel-Bulkley model, the Bingham plastic model and the Casson model.in conclusion, the Herschel-Bulkley model exhibiting a rheofluidifiant behavior proved extremely suitable for describing the experimental data, the viscosity of the emulsion is influenced by the percentage of water in these emulsions (W /O), the shear rate and the temperature.

Keywords: *Non Newtonian, temperature, viscosity, emulsions, Crude oil Algerian, Newtonian, yield stress*

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RECUPERATION D'ÉNERGIE DE LA STATION DE TRAITEMENT LAKHDARIA POUR LA PRODUCTION D'ÉLECTRICITÉ

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ABSTRACT

L'eau qui parvient à nos robinets suit un chemin représenté par les conduites de canalisation. On doit lui fournir de l'énergie pour qu'elle puisse circuler le long de la canalisation. On réalise donc un lien entre l'énergie et l'eau. les stations de traitement d'eau en Algérie consomment de l'énergie électrique pour ses systèmes de pompage et d'éclairage. L'objectif de ce travail est l'étude de la faisabilité de récupération d'énergie au niveau des brises-charges qui sont généralement installés sur le réseau pour briser la pression de l'eau jusqu'au réservoir. Ceci donne une opportunité d'innover dans le secteur hydraulique, en rapprochant l'eau et l'énergie sans émission de CO_2 et avec une énergie inépuisable et économique capable de fournir une énergie hydroélectrique presque en continu.

Keywords: *énergie renouvelable, Simulation, prototype de turbine, hydroélectricité, turbinage d'eau*

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BIOMIMICRY FOR SUPPORTING THE DESIGN OF RENEWABLE ENERGY SYSTEMS AND SUSTAINABILITY IN HOT AND ARID REGIONS

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ABSTRACT

In the framework of climate change, energy efficiency and renewable energy, we are wondering to find new strategies for the energy optimization that leads to identify designs and technologies that minimize the energy use and maximizing energy savings, in hot and arid regions. The duality between biological and engineering systems exists in the pursuit efficient solutions for renewable energy. By adapting biological design principles, nature's technology can be harnessed. In this paper, we present an initiative towards the study and analysis of biomimicry as an important tool for the advances of various areas in energy, environment and engineering Science. The main objective is to investigate new strategies for sustainability and to imitate such living biological systems of adaptation found in flora and fauna of the desert biome in order to transform them into design principles aiming to prove that we can rectify the human reasoning using the nature's genius.

Keywords: *Renewable energy, Biomimicry, Brainstorming tool, Optimization, Bio, Sustainability*

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EXPERIMENTAL STUDY AND MODELING OF A FALLING PARTICLE RECEIVER FOR A SOLAR POWER PLANT WITH ENERGY THERMAL STORAGE

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ABSTRACT

This work focuses on the experimental study of a solid particle solar receiver for heat storage, it is an experimental device on a laboratory scale. The principle is to use sand particles of 0.1 to 1 mm, high specific heat and thermal conductivity as a means of recovery of thermal energy. The mass flow rate of sand particles in free fall as a function of discharge slot openings, measured particle curtain opacities. Characteristics of the particle flow (falling velocity, curtain thickness, mass flow rate, Tin Tout temperature). The volume fraction of solids varies according to the size of the slit opening. In our experimental system, the equipment used to operate this system is an air compressor and a particle dispenser, to lift the particles to the receiver, a cyclone separating the particles and the air has an upper hopper to store the particles before they fall into the receiver, the lower hopper collects the falling particles, with other instruments for measuring temperature, flow, pressure drop. These features include a support structure to accommodate all components. Each of these components must have been designed to withstand temperatures ranging from temperature to 700Â°C. The sizing consists of a 60 cm high opening through which a window variable from 0 to 5 cm, and 50 cm wide, the particles fallen by gravity and heated directly by a heat source (solar radiation). The objective of the current work is to provide an experimental and simulation basis for computational models created to support the development of solid particles as feed systems. in this article, we present detailed information on the design, construction and simulation of the prototype, including the temperature change of the particles in the receiver and storage tank.

Keywords: *thermal storage., high temperature receiver, solid particles*

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SECOND GENERATION ETHANOL PRODUCTION FROM WASTE PAPER

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ABSTRACT

The increasing industrialization and motorization of the world has led to a steep rise for the demand of petroleum-based fuels which are obtained from limited reserves. Hence, it is necessary to look for alternative fuels which can be produced from renewable resources such as bioethanol, biodiesel, vegetable oils. The development of biofuels is becoming among the priorities of the world. Bioethanol is one of the clean and alternative fuels which can be ensure energy security and reduce green-house gases. Second generation ethanol is derived from alcoholic fermentation of simple sugars which are produced from lignocellulosic biomass by hydrolysis process. Lignocellulosic biomass includes wood, agricultural residues, newspaper, waste paper which are abundantly available, low cost, and nonfood material. This study focuses on the production of ethanol from waste paper. Initially, chemical characterization of paper was carried out before its pretreatment. The conversion went through two processes: acid hydrolysis of holocellulose to produce reduced sugars, and anaerobic fermentation of these sugars to ethanol. The fermentation process is carried out by the addition of yeast "Saccharomyces cerevisiae" at 30 °C during 72 hours. The result shows that this material contains 80% of holocellulose. However, Paper can be converted into ethanol 90Â° with a yield of 20% (v/w). The bioethanol obtained has a satisfactory degree of purity and its characteristics correspond to the standards.

Keywords: *alcoholic fermentation, second generation ethanol, bioethanol, waste paper, holocellulose.*

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TREATMENT OF A PETROLEUM OIL DISCHARGE OF HASSI R'MEL BY A FOOD WASTE AND MAGHNIA CLAY

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ABSTRACT

A detailed characterization of Hassi R'mel's crude oil discharge to show that DCO, MES, pollution indicator and heavy metals are high. The Hassi R'mel field generates daily significant quantities of waste water from crude oil and gas production activities. These discharges present quite important pollution indicators that do not meet the Algerian norm or the OMS. A detailed characterization of the crude oil discharge to show that the DCO, the MES, the pollution indicator and the heavy metals are high. Treatment with activated carbon gave the best efficiencies in terms of removal of traces of hydrocarbons with 85.80%, DCO with 78.42%, turbidity with 60.18 %, MES with 77.78%. We note that all values of physicochemical parameters have decreased very significantly in CA methods, the nitrates of 87.84%, the nitrite of a rate of 96.8%, the dissolved oxygen of 38.74% and the conductivity of a rate of 97.30%.

Keywords: *effluents, purification., Activated carbon, dates kernels, adsorption*

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STUDY OF THE INFLUENCE OF THE OPERATING PARAMETERS ON THE ADSORPTION OF A DYE BY A BIOMATERIAL

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ABSTRACT

The growing demand for adsorbent materials for environmental protection processes is prompting further research in the manufacture of unconventional and low cost adsorbents. In this work we have prepared a material from a natural waste namely potato peels to clean up contaminated water with a cationic dye methylene blue (MB). Firstly a characterization of the material was carried out in terms of bulk density, ash content, moisture content, pH and electrical conductivity. A parametric study was carried out subsequently and revealed that this adsorbent gives a better adsorption efficiency with respect to BM molecules (Tx = 95.13%) during a contact time of 45 minutes for a solid mass (4 g), a speed stirring (150 rpm), a solid mass / liquid volume ratio (4 g / 250 mL) and an initial dye concentration (10 ppm) The modeling of the adsorption results gave an L-type isotherm with good compatibility with the Langmuir and Freundlich models.

Keywords: *Characterization, Methylene Blue, Peels of potatoes, Optimization, Adsorption, Isotherm.*

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ELABORATION AND STUDY OF THE HYBRID BLENDS PP / PP-G-MAH / PLA / PRO-OXIDANTS: THE EFFECT OF PRO-OXIDANTS ON THERMAL, MECHANICAL AND RHEOLOGICAL BEHAVIOR

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ABSTRACT

With the increasing usage of the conventional synthetic polymers in our daily life, which has resulted million and million tonnes of discarded plastic materials yearly, this later has become a real ecological concern. This is why the scientist researchers and industries turn their attention to the biodegradable polymers such as PLA, PHA.... which are environmentally friendly materials and they can replace currently used plastics at least in some of the fields. Mixing polymers is a powerful approach especially from an economic point of view, to obtain new materials with interesting properties according to the desired applications. Melt Blending PP with PLA could acquire a new semi-biocomposite with biodegradable property and acceptable performance-cost combination. The compatibilizer PP-g-MAH has been added to enhance the interface between the neat polymers, so the improvement of the different mechanical and rheological properties. The addition of pro-oxidants, which they are commonly used as attempt to accelerate the abiotic oxidation rate by catalyzing chain scission by light and/or heat (thermo-oxidative and/or photo-oxidative degradation), therefore facilitate the degradation of samples mixed with these transition metal complexes by the microorganisms. In this study, we focus on the impact of the prooxidants on thermal (TGA, DSC), mechanical (tensile properties) and rheological behavior (by a dynamic oscillatory rheometer in the melt state) of the compatibilised blends PP/PP-g-MAH/PLA.

Keywords: *polymer blends, polypropylene, Keywords: polylactic acid, pro, oxidants.*

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EFFECT OF TEXTURAL AND FUNCTIONAL PROPERETIES OF ACTIVATED CARBONS ON THE REMOVAL OF LEAD AND CADMIUM FROM CONTAMINATED WATER

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ABSTRACT

Water pollution is an important problem for public health. A compromise between the filtration process cost and its efficiency must be respected. The proposed work consists of developing activated carbon from agricultural waste and then physically and chemically modifying it to optimize lead and cadmium retention. Two activated carbon samples were prepared from olive residue using ZnCl2 and H3PO4. The obtained samples (CA1, CA2) were characterized using nitrogen isotherms at -196°C, Fourier transform infrared (FTIR) and Raman spectroscopy. The samples CA1 and CA2 were subjected to heat treatment at 500°C under an inert atmosphere, the samples thus obtained are respectively named CA1T and CA2T. This treatment aims to eliminate carboxylic acid functions. The same characterizations were performed on the treated samples. The samples were used for lead and cadmium adsorption. The effect of the activating agent and surface functions on the efficiency of activated carbons for the retention of these metals is thus demonstrated through the analysis of the filtrates by atomic absorption spectroscopy (AAS). The obtained results show that CA1 and CA2 are porous with BET specific surface area greater than 1500 m2/g. The heat treated samples CA1T and CA2T have porous properties close to those of the CA1 and CA2 samples. Raman spectra show that the heat treatment has no effect on the graphitic structure of the coals. The results of the FTIR spectroscopy indicate that the heat treatment has considerably decreased the number of carboxylic acids. The AAS results show that the activating agent and the surface functions significantly influence the adsorption of the two toxic metals Pb and Cd.

Keywords: *surface functional groups, heavy metals, adsorption, heat treatment, activated carbon*

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SPECTROSCOPIC STUDY OF A CA0.91-XCE0.09RB0.04CSX[(ZR0.50TI0.45)AL0.05]O3, X=0.2 - 0.4, COMPLEXE PEROVSKITE DEDICATED TO CS-RB CONFINEMENT, BY FTIR AND RAMAN.

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ABSTRACT

Perovskite is a mineral belonging to Synroc. It is dedicated to both alkaline and alkali-earth radioactive elements confinement. In this study, a perovskite with the general formula Ca1-xCe0.09Rb0.04Csy[(Zr0.50Ti0.45)Al0.05]O3, x=0.33-0.53, y =0.2-0.4, is synthesized by sintering at 1150Â°C during 16 h. Cerium element is an actinide surrogate. Both Cs and Rb are taken in their stable isotopic form. The Goldschmidt tolerance factor for the three chemical compositions is between 0.80 and 0.86. it is in accordance with the orthorhombic perovskite interval field. The perovskite green density (dg) for the three studied chemical compositions is between 5.1 and 5.2. After sintering, the materials swell, and the sintered density (ds) is about 2.7. The XRD phase identification reveals an orthorhombic perovskite with a Pnma group space. The FTIR analysis shows the main absorption bands of TiO6 octahedra, ZrO7 and CaO8 polyhedra, Ti-O-Ti in CaTiO3, as well as those of Ti-O, Zr-O, and Ca-O bonds of titanates cuboÃ¯ds. Except doped material with 0.2 at. % Cs, the materials Raman analysis performed at room temperature shows the twenty-four active modes of the CaTiO3 Pnma orthorhombic structure, which are mainly anharmonic ; many Raman bands being more sensitive to the lattice volume, tolerance factor value, and to cationic sites range.

Keywords: *Perovskite, Cs, Rb, confinement, radioactive waste, XRD, FTIR, Raman.*

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DESIGN AND REALIZATION OF A SMALL BIOMASS BOILER FOR THE PRODUCTION OF HOT WATER

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ABSTRACT

Equipment for the production of domestic hot water or heating, generally use fossil fuels as a source of energy, their combustion generate pollution, the element responsible for global warming, in addition to the depletion of these fossil resources. So the cure is to replace these conventional sources with renewable and sustainable clean sources. Biomass presents an interesting solution among alternative energies to consider renewable because of its neutral carbon emitted during its life cycle, so its existence is varied whether its forestry, agricultural or waste recovery from the agri-food industries, The purpose of this paper is the design and construction of a small boiler for hot water production, using pellets from various biomass wastes as fuel, all by analyzing the performance of these biofuels and the effects of biomass. gas produced by their combustion on the environment, judging corrections to be made if necessary to our equipment.

Keywords: *biomass boilers, biomass combustion, biomass, environmental impact*

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MISE EN EVIDENCE DU COMPORTEMENT DES GRANULATS DE BETON RECYCLES RENFORCES PAR DES SUBSTITUTS DE POUDRE PLASTIQUE

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ABSTRACT

Il y a peu de temps encore, pour s'en débarrasser des déchets, il suffisait de les déverser dans les cours d'eau, la mer ou de les abandonner dans les forets, alors, on a commencé à entendre parler de pollution des rivières, des nappes phréatiques, des océans, de perturbation de chaines alimentaires et des maladies qui se sont apparues. Cet article traite le recyclage des déchets les plus abondants. A savoir les déchets de construction ainsi que les déchets plastiques qui représentent un pourcentage important de l'industrie de construction et des ordures ménagères et les possibilités de leurs réemplois dans le domaine des travaux publics (couches de chaussées). La valorisation de ces produits a un double effetÂ : elle permet d'éviter à la fois la mise en décharge (risque de pollution environnementale) et permet de limiter l'utilisation des granulats naturels (appauvrissements des ressources naturelles). Le but principal de ce travail, est l'étude expérimentale de la portance des agrégats de démolition de béton renforcés par des substituts partiels de poudre plastique, Pour ce faire, ces mélanges, sont soumis à l'essai de cisaillement à la boite pour étudier leur comportement afin de déterminer la composition optimale qui améliore leur portance pour une éventuelle utilisation dans les couches de chaussée. Les résultats des essais réalisés ont montré que la résistance au cisaillement des mélanges est améliorée pour un pourcentage d'ajouts de 8% de poudre plastique.

Keywords: *cisaillement, recyclage, Matériaux de démolition, poudre plastique.*

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METAL-ORGANIC FRAMWORKS (MOFS): ADVANCED TECHNOLOGY OF ARCHITECHITECTURAL INSTABILITY AGAINST MOISTURE

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ABSTRACT

The chemical and structural stability control metal-organic frameworks is well linked to the synthesis step as well as to the post-synthetic modification step, which allows the MOF to be oriented towards a specific application. In the case of gas adsorption, instability to humidity causes a structural collapse and a big drop of surface area about 80% for the MOF-5 after one week of exposure to humidity, which reflects a significant reduction in sorption capacity. For what follows a comparative work is carried out with the post-synthetic approach modification of the ligand through hydrophobic groups and also by stabilization the energetic barrier of structural activation against water in order to stabilize the metal-ligand interactions.

Keywords: *Metal, Organic Framework (MOF), Post, Synthetic Modification, Moisture, Water stability.*

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STRUCTURAL AND MORPHOLOGICAL CHARACTERISTICS OF ALGERIAN PALM FIBERS FOR BIOTECHNOLOGY APPLICATIONS

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ABSTRACT

Palm trees in general are trees that grow in harsh environmental conditions because they have important characteristics that made man through history exploits these features in many fields and every part of this tree is the focus of many researches, Palm fibers are one of the most biomaterials used in the wide of variety of applications due to its promising properties such as: low cost, available and environmentally friendly and for to know more about its morphological and structural characteristics that make it the best choice in many biotechnology applications, the sophisticated characterization techniques were used for this purpose such as Scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), X-ray Diffraction (XRD). This present study is devoted to the morphological, structural, chemical and physical characterization of raw biomaterial of Algerian Palm fibers. The morphological and structural analysis performed on raw palm fibers showed that these lignocellulosic fibers present a large variability in the surface and the many groups function; the results also show that fibers have a high crystalline index, higher than amorphous phase.

Keywords: *Biotechnology., Biomaterial, Characteristics, Palm fibers*

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STUDY OF THE STABILITY OF A WATER-IN-OIL EMULSION INTENDED FOR THE EXTRACTION OF HEAVY METALS

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ABSTRACT

This work aims to optimize the parameters influencing the stability of a W/O emulsion and to use it in the extraction of heavy metals present in aqueous media. The study of the emulsion stability shows that a time of emulsification of 10 minutes, a concentration of surfactant, Span80 at 3% (w/w), a concentration of extractant, Triethylamine at 5% (w/w), an internal phase concentration of 0.75 M in H3PO4, a volume ratio of the membrane phase to the internal phase of 1, a volume ratio of the external phase to the emulsion of 20 and a stirring speed of 180 rpm lead to the formulation of a stable emulsion. The results of extraction of the copper ions show that under the best optimized experimental conditions, the extraction yield is equal to 93.33% for 20% extractant content, a contact time of 12 minutes and a concentration of initial copper ions of 400 ppm. The results obtained prove that by an appropriate choice of experimental parameters, it is possible to extract almost all the metal ions present in the solution, which shows that the emulsified liquid membrane extraction (MLE) process is a method of very interesting separation for the removal of heavy metals.

Keywords: *Extraction, Heavy metals, Copper ions., Emulsified liquid membrane, Stability*

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LIFE CYCLE ASSESSMENT AS AN ENVIRONMENTAL SOLUTION IN THE PRODUCTION OF GALVANIZED TUBES

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ABSTRACT

Life Cycle Assessment (LCA) is a method for assessing the potential environmental impacts of a system that includes all the activities associated with a product or service, from the extraction of raw materials to the disposal of waste. In our study, an LCA was carried out on the galvanization workshop of steel tubes within a company, in order to define the best production choice, i.e. hot or cold galvanization, for this purpose, all material and energy flows were aggregated to quantify the environmental impact indicators using the SIMAPRO tool in order to achieve an environmentally friendly design and to move towards sustainable development Â

Keywords: *Environmental impact, Production choice, Galvanization, LCA, Steel pipes*

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EXTRACTION AND CHARACTERIZATION OF ESSENTIAL OIL AND HYDROLATE OBTAINED FROM AN ALGERIAN LEMONGRASS (CYMBOPOGON CITRATUS)

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ABSTRACT

Lemongrass (Cymbopogon citratus) is a medicinal plant which largely uses in popular medicine. It has cultivated for the commercial production and used in pharmaceutical, cosmetics and food industries. The aim of this work was to characterize lemongrass essential oil and hydrolate. The lemongrass was cultivated and grown under Algerian ecological conditions. The essential oil and hydrolate were obtained from leaves of lemongrass by hydrodistillation on an industrial scale (yield: 0.8 %). The physicochemical properties of the essential oil were investigated to determine its quality. The lemongrass essential oil and hydrolate were then analysed by attenuated total reflectance-Fourier transform infrared spectroscopy (ATR-FTIR). The lemongrass essential oil was also analysed by gas chromatographic coupled with mass spectrometry (GC/MS) for the determination of its chemical composition. The essential oil was pale yellow aromatic liquid which was non soluble in ethanol. Lemongrass essential oil and hydrolate exhibited approximate pH, relative densities and refractive indexes of 4 and 6, 0.891 and 0.998, 1.488 and 1.333, respectively. The lemongrass essential oil acid value, iodine value, and peroxide value were 1.402 mg KOH/g, 69.80 g/100 g and 3 meq O2/kg, respectively. FTIR spectra of both essential oil and hydrolate showed the presence of alkanes, alkenes, aldehydes, alcohols, carboxylic acids. Ethers and aromatics appeared in the essential oil only. The GC-MS analysis revealed nineteen components in lemongrass essential oil which are belonging to five different chemical classes (monoterpenes, oxygenated monoterpenes, sesquiterpenes, oxygenated sesquiterpenes, diterpenes and others). The oxygenated monoterpenes are the most abundant chemical class (92.33%). Lemongrass essential oil has Isogeranial (41.77%), Neral (43.75%), Î²-Pinene (5.77), Geranial (3.78%) and Isoneral (1.90%) as major compounds.

Keywords: *FTIR spectra, physicochemical properties, hydrolate, Lemongrass essential oil, GC/MS analysis.*

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REMOVAL OF ORGANIC POLLUTANTS FROM WASTEWATER USING GAMMA RADIATION

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ABSTRACT

This study focuses on the use of modified cellulose fibers of â€• Luffa cylindricaâ€• as an adsorbent in a secondary process following radiation processing of waste water. The secondary process consists of adsorption of the remaining of POPs pesticides and PAHs and radiolysis products in real samples. Gamma radiation was used for the degradation of organic compounds, first on a synthetic aqueous solution of fenitrothion (FNT) and naphthalene (NAF), then on wastewater samples collected from a treatment plant that receives domestic wastewater, industrial and sewer effluents.The irradiated samples were submitted to the secondary process in a glass column, to reduce the POPs and the products of radiolysis, by adsorption. The study was conducted on FNT and NAF (POPs) synthetic solutions (150 mg /l). The solutions were submitted to gamma rays of 60Co to absorbed doses of 2,4,6,8 and10kGy. The results showed that 99.7% of FNT were degraded at 10 kGy. A complete degradation of NAF has occurred at 10kGy. An adsorption by cellulose modified fiber was carried out on synthetic control solutions of FNT and NAF. A wastewater sample was irradiated at the same doses as for the synthetic solutions. The degradation and the adsorption by the modified cellulose were followed by HPLC. The results revealed the presence of traces of FNT and NAF in the effluent control sample with a respective peak area of 303 and 132mAU. A decrease of the peak area with the increase of absorbed doses was observed. A complete degradation of FNT and NAF occurred at 10kGy and 8kGy respectively. The adsorption by modified cellulose reduced the peak area of FNT and NAF with respective adsorption rate of 53%- 60% of the effluent control sample and reached 18% at the dose of 8kGy for FNT and 28% at the dose of 6kGy for the NAF.

Keywords: *Gamma radiation, Glass column, Modified cellulose fiber, Adsorption, Degradation, Fenitrothion, Naphtalene, HPLC.*

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INFLUENCE OF LEACHATE POLLUTION ON HYDROMECHANICAL PROPERTIES OF SANDY SOILS-BENTONITE MIXTURE

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ABSTRACT

An empirical study on the chemical characteristics, swelling characteristics, mineralogical characteristics, hydraulic conductivity and shear strength of compacted bentonite- sandy soil mixtures used as landfill lining is presented in this paper. Landfill leachate was used to determine the effect of pollution on the parameters of these mixtures for each experiment. To carry out this study, three materials, including bentonite and two types of soils, namely tuff and calcareous sand, were collected in the Laghouat - South Algerian region. A study of the geotechnical properties of all selected materials and mixtures was initially performed. XRD results showed that the dissolution of minerals and montmorillonite content by landfill leachate modifies decreases in swelling characteristics and slight increases in saturated hydraulic conductivity. The pH and electrical conductivity measurements of leachate contaminated mixtures revealed a decrease in pH values and an increase in electrical conductivity values. In terms of shear strength, an increased shear strength was reported with increased calcareous sand content. As a result, the shear strength of the previously exposed optimal mixture results in an increase in apparent cohesion (Cuu) and a decrease in the apparent angle of friction (Ï†uu). According to the results, the mixture of 10% bentonite - 20% calcareous sand - 70% tuff mixture responds to the structural criteria for compacted soil liners. Â

Keywords: *Landfill liners, chemical characteristics, conductivity hydraulic, shear strength, Leachate, Bentonite*

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DURABILITE DU PATRIMOINE ARCHITECTURAL SAHARIENNE EN TERRE "CAS DE LA CASBAH DE TAYLOUT- KSAR TAMENTIT A ADRAR "

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ABSTRACT

La présente contribution s'inscrit dans un contexte global de réflexion sur la valorisation du patrimoine architectural en terre de la région d'Adrar. Elle explore la valeur patrimoniale des architectures en terre à la faveur de la préoccupation actuelle du développement durable et la nécessité de leur conservation et valorisation dans notre pays. les ksours au sud ont subi les aléas du temps, des facteurs naturels, la négligence des politiques de planification et d'urbanisation, mais aussi la main des destructeurs de tout ce qui touche à la mémoire collective, à l'identité culturelle, au cachet architectural du pays. Malgré à la fragilité apparente à des matériaux utilisés, ces lieux résistent encore, et l'efficacité des systèmes constructifs appliqués est remarquable. Ces ksours sont toujours lÃ depuis des centaines d'années. Les résultats d'analyses et de diagnostic et de collecte d'information au sein de la communauté local ,ont montré que la durabilité de ces ksours est fortement liée aux caractères architecturales des édifices, aux caractéristiques physiques, minéralogiques et mécaniques adaptés à l'architecture en terre et l'environnement saharienne ainsi que le savoir-faire des anciens .

Keywords: *casbah de ksar Tamentit, architecture en terre, durabilité, mise en valeur du patrimoine terre*

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CONTRIBUTION TO THE TREATMENT OF BY-PASS DUSTY WASTE GENERATED BY THE CEMENT INDUSTRY

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ABSTRACT

The cement industry in the world today is the basis of modern urbanization, but this heavy industry has many environmentally harmful residues such as dusty waste generated by the BY-PASS (BpD) system (study case of BISKRIA cement) which are rich in chloride and sulphide. The amount of dust thrown into the atmosphere in the average exceeds 1000 tons / month. In this work we try to exploit this waste and recycle it to produce a material (pavement) usable for the construction of sidewalks. In order to carry out this work we carried out a set of quantitative and qualitative analyzes (Tonnage, Determination of fineness, X-ray fluorescence spectrometry (XRF), Dosage of SO3, Dosage of Cl, Density,...) on the raw material and the dusty waste to see the possibility of achieving our aim. After the preparation and the molding, a physico-mechanical analyzes (The consistency, The resistance,...) were carried out on our final product and the results obtained were very satisfactory. In this way we have succeeded in exploiting the dusty waste and converting it into a useful material and contributing in a certain way to the preservation of the environment and the health of the population; especially those who live near cement factories.

Keywords: *Recycling, Pollution, Pass system, By, Dusty waste, Cement.*

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CARBON DIOXIDE ABSORPTION BY CHEMICAL ABSORPTION: A COMPARISON BY DIFFERENT SOLVENT

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ABSTRACT

The global warming caused by increasing emission of carbon dioxide is one of the most serious environmental problems. Carbon dioxide from flue gas for power and heat production is said to occupy nearly 35% of the amount of discharged CO2 all over the world. To reduce CO2 emission, carbon dioxide can be separated from flue gas by different techniques such as CO2 absorption with MEA and DEA, Ammonia for addressing the climatic change concerns. The study based on, effect flow rate and concentration of solvent on the CO2 absorption by different Solvent. It was found from the study that an increase in the liquid flow rate and in concentration of monoethanolamine a results in an increase in CO2 absorption value. With the liquid flow rate increasing, more liquid would be spread on the packing surface, and this leads to an increase in the interfacial area per unit volume. This helps the gas to absorb into the solvents at a higher rate. It was observed that, when the contact time increases the CO2 absorption increases for MEA, DEA and NH3. This was due to the reason that, when the time of contact between the gas and the liquid solvent increases, gas molecules get more time to diffuse into the liquid solvent. So sufficient contact time was needed for the effective absorption. On the other hand, increase in concentration in case of MEA and DEA leads to the increase in viscosity of the liquid. This causes the molecular diffusion to reduce. The increasing viscosity also tends to cause a reduction in the effective interfacial area between gas and liquid. The increase in ammonia concentration seems to show that the effect of ammonia concentration on the liquid viscosity is less than the effect of MEA and DEA.

Keywords: *different Solvent, Chemical Absorption, environmental, carbon dioxide, climatic change.*

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RECYCLING OF PLASTIC WASTE AS A MODIFIER IN BITUMINOUS PAVEMENT- STUDY OF CREEP-RECOVERY AT MEDIUM AND HOT TEMPERATURES

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ABSTRACT

One of the global environmental problems is the millions waste product from plastic industry, which is using different types of polymers such as polyethyleneÂ tetraphthalate (PET), polypropylene (PP), polystyrene (PS), etc., deposited in household waste and landfills. These plastics are a toxic and a persistent material; Thus, the disposal of plastic waste is a threat and becomes a serious problem globally because of their non-biodegradability and unsightly vision. Today, the recovery of industrial and household waste in bituminous pavements has become an ecological technique that contributes to the preservation of natural resources. In other side, the conventional binders provide certain limited performance under severe traffic, climate and environmental conditions, hence the common problems of thermal susceptibility, such as the risk of permanent deformation at high service temperatures and the phenomenon of remarkable fragility at low temperatures. The present study was an aim to investigate the effect of polyethyleneÂ tetraphthalate (PET) plastic waste, used us bituminous mixture by dry process, on creep-recovery behavior of Hot Mix Asphalt (HMA). As part of our study, we are interested in studying and comparing ordinary bituminous mixture without and with the introduction of a plastic waste (PET), and tested in four point bending test at two temperature medium (20°C) and high temperature (50°C). This technique is a contribution to improving quality and reducing costs of HMA, for alternative materials. The use of 5 % of PET gave a better thermo-mechanical performance. Further, a total reduction in deformation is 20 °C and 50 °C respectively. It was met with improved resistance to the creep permanent deformation and stiffness of life. This modification serves a powerful, economic and environmental solution for road construction of hot Saharan areas at medium and high temperature of service.

Keywords: *bituminous mixture, Creep, recovry deformation, polyethylene tetraphthalate (PET), Plastic waste, Performance*

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SPECTROSCOPIC ETUDE (FT-IR SPECTROSCOPY) OF THE FUNCTIONAL STRUCTURE OF ACTIVATED CARBON FROM THE TREATMENT OF ACTIVATED BROWN ALGAE BY DIFFERENT CHEMICAL AGENTS

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ABSTRACT

Activated carbon is an adsorbent product with an extremely porous structure with a large specific surface inlaid with several chemical functions. To understand the adsorption mechanisms involved, it is necessary to study the functional structure of this active surface and the influence of the diverse parameters. This work was consecrate to the study of the development of this structure by a spectral technique: Fourier transform infrared spectroscopy FT-IR which focuses on vibrational transitions and the determination of functional groups in molecules. At the SEA2M laboratory, we develop carbon from plant biomass such as green algae (marine biomass) existing on the coast of Mostaganem which has given a good adsorption capacity for organic and inorganic pollutants. Etude of the evolution of the functional structure of these algae treated by different activating agents (HCl treatment and CaCl2 treatment) has shown a remarkable differentiation in the functional groups developed in this structure.

Keywords: *Carbon, FTIR spectroscopy, Adsorption*

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AMELIORATION DE LA CAPACITE D'ADSORPTION MODIFIEE DE LA BENTONIE POUR L'ELIMINATION DE L'AMMONIUM EN UTILISANT UN BIOPOLYMERE RETICULE COMME SUPPORT D'ENCAPSULATION

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ABSTRACT

Les polysaccharides composites avec des argiles inorganiques présentent des avantages particuliers par rapport aux polymères synthétiques, en raison de leur coût économique, de leur biocompatibilité, de leur nontoxicité et de leur biodégradabilité. Pour ces raisons et afin d'améliorer l'efficacité de l'adsorption d'ammonium, un composite d'alginate de calcium réticulé avec la bentonite préalablement modifiée par une solution hyperalcaline, a été étudié pour notre adsorption d'ammonium. Les résultats d'optimisation du dosage de l'argile dans la matrice polymérique suggèrent que le rapport optimal Alginate / Bentonite est de 2/3 (g / g), ce qui donne un rendement maximum d'adsorption de 70,07% pendant 2h et de 76,76% pendant 24 heures d'agitation. L'étude des effets des paramètres opératoires sur le procédé révèle qu'une meilleure adsorption de l'ammonium sur des billes composites a été observée à pH = 7; T = 30 ° C; [NH4+] = 10 mg / L et une concentration initiale d'adsorbant de 0,1 g / 25ml, avec un temps de contact de 60 min lorsque l'efficacité d'adsorption atteint son maximum. De plus, le modèle approprié pour l'analyse des données expérimentales est celui du pseudo-second ordre avec une valeur maximale de RÂ² de 0,999. La valeur de la capacité d'adsorption à l'équilibre théorique calculée Ã partir de l'équation linéaire de ce modèle est approximativement égale à la valeur expérimentale. Finalement, les analyses de caractérisation des matériaux et de l'eau contaminée après le processus d'adsorption ont prouvé ces résultats

Keywords: *ammonium, adsorption, billes réticulées, bentonite modifiée, cinétique*

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USE OF MG/AL -LAYERED DOUBLE HYDROXIDE FOR WATER DETOXIFICATION: APPLICATION TO AMOXICILLIN REMOVAL.

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ABSTRACT

Antibiotics are extensively used pharmaceutical compounds to prevent or treat bacteria infections of human, animals and plants. By providing the effective access of reducing common infectious diseases, antibiotics have been playing an indispensable role in modern medicine.It has been concluded, as the aging population and the increasing live quality, global antibiotic consumption increased by 36% between 2000 and 2010. The current study investigated especially the removal of amoxicillin (AMX) antibiotic using Mg/Al-Layered double hydroxide. This material was synthesized by co-precipitation method, with Mg2+/Al3+molar ratio of 2 at constant pH of 9.The resulting material was characterized by Thermogravimetry (TG), Fourier transform infrared spectroscopy (IR), Powder X ray diffraction patterns which confirm the good crystallinity of the solid before and after adsorption. The surface charge of the AMX and Mg/Al-LDH were measured using zeta potential technique. The effects of different parameters on adsorption onto Mg/Al-LDH such as pH, temperature, contact time, initial AMX concentration were investigated. The adsorption kinetics fitted well the pseudo-second order kinetic models, experimental data agreed satisfactorily with Sips isotherm model. The thermodynamic parameters have been calculated, the adsorption process was found to be spontaneous and endothermic. Our material was three times recycled. The best result for re-use Mg/Al-LDH was found for the first cycle after adsorption.

Keywords: *LDH, Mg/Al, adsorption, Antibiotic amoxicillin, kinetic, regeneration.*

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PHYSICOCHEMICAL AND FOAMING PROPERTIES OF CRUDE ACID WHEY TREATED BY ULTRAFILTRATION

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ABSTRACT

The crude acid whey is a cheese rejection derived from the manufacture of soft cheeses and fresh dough, by its fermentable biomolecules; it represents a real factor of biological pollution of freshwater ecosystems (Wadi of Mina, Relizane, Algeria). Our study aims to analyze the effect of membrane treatment (ultrafiltration) on the physicochemical parameters (COD,turbidity, Â°Brix,pH,salinity and electrical conductivity) and foaming properties (foaming capacity and diameter of air bubbles) of crude acid whey by applying physical, chemical and interfacial analysis methods.The results have shown that a variability has been noted for the physicochemical parametrs COD(CAW:1159mg/l,PCAW : 525mg/l and CCAW : 1355mg/l),turbidity(CAW: 237.66NTU, PCAW: 0.86NTU and CCAW: 72.1NTU),°Brix(CAW: 7.45% ,PCAW: 5.8% and CCAW: 10%,),pH(CAW: 4.6, PCAW: 4.6 and CCAW:4.9),salinity(CAW: 3.58g/l, PCAW: 3.95g/l and CCAW: 3.77g/l) and electrical conductivity(CAW: 5.8mS/cm, PCAW: 6.39mS/cm and CCAW: 6.4mS/cm) and interfacial properties stability (foaming capacity and diameter of air bubbles) of crude acid whey and its fractions after ultrafiltration (concentrate and permeate).It is concluded from this study that the ultrafiltration of crude acid whey has changed its physicochemical and foaming behavior in function to the operating conditions and to the composition of the studied whey.

Keywords: *valorization., foam, pollution, ultrafiltration, Crude acid whey*

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INFLUENCE OF SALT ADDITION ON REMOVAL OF PHENOL COMPOUND FROM INDUSTRIAL WASTEWATER USING SOLVENT EXTRACTION

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ABSTRACT

The aim of this study was to survey on the effect of three dissolved salts, namely, sodium chloride (NaCl), potassium chloride(KCl) and lithium chloride (LiCl), on the liquidâ''liquid equilibrium of phenol remove from Industrial wastewater phase by xylene was investigated at the temperature of 298.15 K and the ambient pressure of 81.5 kPa. The distribution data of the quaternary system have been determined at salt unsaturation with mass fractions of 0.05, 0.1 and 0.15 in water were used and significant enhancement in the phenol remove was achieved compared to salt-free system. The obtained experimental results showed that the salting-out effect for phenol compound is more pronounced for LiCl than for NaCl and KCl.

Keywords: *phenol., salting out, Setschenow equation, solvent extraction, wastewater*

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OPTIMIZATION OF EXPERIMENTAL CONDITIONS FOR FLASH PYROLYSIS OF WOOD PARTICLES IN AN ENTRAINED BED REACTOR

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ABSTRACT

Devolatilisation of wood particles was studied in an entrained bed flow reactor for matter valorization. Small particles diameters (350 µm-125 µm) were used for the optimization of experimental conditions for the production of bio-oil pyrolysis. A model predicting the heating of the particle along the reactor was developed in order to determine the spatio-temporal temperature profile of the biomass particles. The simulations carried out using the elaborate calculations method, made it possible to elucidate the influence of different operating variables allowing the particles to reach the pyrolysis temperature. It has been shown that a low gas flow rate is more favorable for the particles to reach the pyrolysis temperature before leaving the reactor. The calculations showed a difference in the particle temperature and residence time when the particle size changes from 125µm to 350 µm. This approach has led to define an effective residence time which is the time during which the particles are at the same temperature as the gas. At the end of this study, we selected the operating conditions at temperature ranging between 400 and 550 °C and gas flow rate at 20l/min

Keywords: *flash pyrolysis, wood, biomass, entrained bed reactor*

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ÉTUDES COMPARATIVES DES PROPRIETES MECANIQUES D'UN MATERIAU COMPOSITE A BASE D'UNE MATRICE POLYMÈRE CHARGE DES PARTICULES DU DÉCHÉS SYNTHÉTIQUES ET NATURELS

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ABSTRACT

Dans l'objectif de préserver l'environnement devant l'agressivité des déchets et que cette dernière est un problème vaste à la fois économique et écologique, il est devenu nécessaire d'étudier les différentes possibilités de les valoriser. Dans ce cadre, on introduit ce travail qui porte sur la valorisation des déchets synthétiques (pneus à usagés de voiture) et naturels (plumes du poulet de chair) et leur insertion comme un agent renforçant intéressant dans les matériaux composites ; au premier temps les pneus et les plumes sont nettoyés, séchés et broyés afin de les caractériser par spectroscopique infrarouge Ã transformée de Fourier. Ensuite des éprouvettes sont élaborées avec différentes granulométriés et taux de charge, et une étude en traction a permis de comparer et de déterminer les propriétés mécaniques dont le module d'Young en traction, ainsi que la contrainte et l'allongement à la rupture et à la fin une analyse par la BET et le microscope électronique à balayage (MEB) qui s'appuie sur la caractérisation de la granulométrie, la morphologie et les propriétés de surface spécifiques de matériau composite.

Keywords: *Matériau composite .charge synthétique .charge naturelle .propriétés mécaniques.*

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ISOLATION DES BIOPOLYMERES (CHITINE ET CHITOSANE) DE LA BIOMASSE FONGIQUE DU PLEUROTUS OSTREATUS (JACQ : FRIES KUMMER)

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ABSTRACT

La chitine et le chitosane, polysaccharides similaires à la cellulose, ont prouvé leurs intérêts dans de nombreux domaines : biologie, médecine, environnement, pharmacie, agroalimentaire,...etc. Les travaux publiés depuis les 5 dernières années ont proposé de valoriser les biomasses fongiques comme sources alternatives aux biomasses marines. En particulier, les basidiomycètes sont des microorganismes préconisés pour l'extraction des polysaccharides présents dans leurs parois cellulaires. Dans cette étude, il a été proposé un champignon comestible Pleurotus ostreatus (Jacq : Fries Kummer) pour la production de la biomasse mycélienne en vue d'extraire la chitine et le chitosane. Dans le cadre de la protection de l'environnement, il a été procédé à la valorisation des biomasses fongiques issues des différents mycéliums de P. ostreatus récupérés lors de la récolte du champignon cultivé sur des substrats naturels solides composés de grignon d'olive (Go), marc de café (Mc) et paille de blé (Pb). Les traitements chimiques (avec NaOH 1M à 121°C pendant 15min puis CH3COOH 0,35M à 95°C pendant 8h) ont permis d'extraire 76mg/g de biomasse et 3,7mg/g de biomasse de chitine et du chitosane, respectivement. En comparaison avec la chitine d'origine marine (Fluka), les analyses FTIR ont décelé une forte similitude dans les pics mais à faibles intensités avec les mycéliums de P. ostreatus.

Keywords: *Mycélium, Cultures Solide, Chitine et Chitosane, Biomasse, Pleurotus Ostreatus*

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HEAVY METALS IN FLUE GAS EMISSION AND ASH GENERATED BY AN INCINERATION PLANT FOR HOSPITAL AND INDUSTRIAL WASTE IN NORTHERN OF ALGERIA

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ABSTRACT

Metal elements in ash and flue gas emission samples, generated by an incineration plant of clinical and industrial waste, were investigated at the sole incineration waste plant currently operating in Northern Algeria. We studied the incineration of several types of waste like wastewater treatment plant sludge, expired pharmaceuticals and clinical waste. For each of them, we collected samples of flue gas particulates and ashes after incineration. The characterization of the metal elements associated with the ash and flue gas particulates was carried out by X-Ray Fluorescence analysis (XRF). Flue gas results indicated that the emission concentrations of the regulated metal elements, expressed in mg Nm-3, were in the range of 0.0004 - 0.4090 for Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V+Sn and 0.0005 to 0.1540 for the total of Cd+Ti, while for the regulated toxic metal elements in ash related to the recovery, maturation or storage of solid incineration residues; expressed in percentage, average levels reported were respectively 0, 0.003, 0.0001 and 0.001 for Hg, Pb, Cd and As. The results showed that the contribution of the metal elements analyzed was relatively low for all the matrices analyzed. To confirm the influence of the presence of chlorine in the waste on the concentrations of the metallic elements in the gaseous emissions, a characterization of chlorine and others chemical components as C,Si,K elements in flue gas particles was performed using SEM-EDX.

Keywords: *metallic elements, sludge, XRF, SEM, EDX.*

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ELECTRODYNAMICS EDDY CURRENT SEPARATION OF WASTE

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ABSTRACT

Eddy current separators have been used to recover nonferrous metals from solid wastes and for separating various nonferrous metals from each other. High frequency eddy current separator is used for sorting powder and small particles of conductive materials from wastes by using a Variable Frequency Electromagnet. This separator is characterized by coil excited with an alternating current and ferrite core with an air-gap. The numeric simulation of electromagnet separator with finite element method had permitted to evaluate magnetic characteristics near the air gaps in 2D. This simulation shows the magnetic flux density, magnetic force and eddy current in aluminum circular particles with different sizes at excitation resonance frequencies placed in a time varying magnetic field is presented in this paper.

Keywords: *eddy current, time, varying magnetic field, waste particle, powder.*

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INHIBITION DE LA CORROSION DE L'ACIER ASTM A915 DANS UN MILIEU CHLORURÉ DE 0,1 M, PAR LE NITRATE DE CÉRIUM : EFFET DE L'AJOUT DU POLYÉTHYLÃˆNE GLYCOL (PEG)

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ABSTRACT

Dans cette étude, le cérium a été utilisé en tant qu'inhibiteur afin d'améliorer la résistance à la corrosion de l'acier ASTM A915, dans une solution chlorurée de 0,1M NaCl. En effet, l'augmentation de la concentration de Ce3+ jusqu'à 600 ppm ou 1,4.10-3 M (valeur optimale) a permis de diminuer rapidement la vitesse de corrosion Icorr après 30 minutes d'immersion. De même, l'immersion de courte durée a induit la perte de l'effet bénéfique du cérium. L'ajout de PEG au nitrate de cérium a par ailleurs permis d'améliorer davantage la résistance du matériau, suite à la diminution du nombre de nodules et de fissures au sein du film protecteur. La réalisation du travail a été faite à l'aide des techniques électrochimiques : variation du potentiel en circuit ouvert, spectroscopie d'impédance électrochimique et polarisation potentiodynamique. Ainsi, la surface du métal a été caractérisée par des techniques physico-chimiques : DRX, spectroscopie de Raman et le microscope électronique à balayage (MEB) couplée avec l'analyse EDS.

Keywords: *spectroscopie d'impédance électrochimique, polarisation, éléments de terres rares, inhibition de la corrosion, Acier doux, caractérisation des matériaux.*

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STABILIZATION OF CLAY SOILS BY RECYCLED PLASTICS IN SHEAR TESTS

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ABSTRACT

This work is simply a contribution to solving the environmental problem concerning plastic waste. Indeed, the integration of these recycled plastics in the natural material namely clay is an economical alternative and a sustainable solution in road techniques, in foundation soils and in the bodies of dams. The simultaneous addition of recycled plastics (aggregates made of recycled plastic and crushed pvc) and sand makes it possible to study the evolution of the shear characteristics of the clay material. Sand was added at grades of 0 to 25% with a 5% pitch, while plastic aggregates were added at levels of 0 to 7%. The samples made from the three materials (clay - sand and recycled plastics) were then subjected to shear forces at the box ranging from 100 to 400 kPa. The results of shear strengths and the intrinsic characteristics obtained have shown that clay soils can be successfully stabilized by recycled plastic aggregates or crushed PVC and by sand.

Keywords: *shear test, plastic, sand, clay, characteristics.*

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RECYCLED AGGREGATES TREATED BY CEMENT PASTE

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ABSTRACT

The depletion of natural aggregate deposits and the difficulties in setting up new quarries make it necessary to look for new sources of supply in order to meet the aggregate requirements for large construction sites. Recycling demolition construction waste as a source of aggregates for concrete production has interest the construction industry. It turned out that these aggregates are surrounded by the old cement paste which is porous and absorbs a lot of water. The purpose of this research is to reduce the recycled aggregates high-water absorption by the cement paste treatment. This study consists of the analysis of the physical properties of natural aggregates and recycled before and after treatment as well as their impact on the mechanical properties of concretes. In addition to conventional tests such as granulometric analysis, density measurement and absorption testing.The characterization of the materials used showed that the treated recycled granules had heterogeneity and a high-water absorption capacity. Five formulations have been developed: a natural aggregate concrete, so-called reference, two recycled aggregates with two volume substitution rates: 50% and 100% and two recycled aggregate treated with cement paste with two volumetric substitution rates as well: 50% and 100%. Mechanical strengths (compression and tensile strength) were evaluated for concreted mixtures at 2, 7, 14 and 28 days. The results obtained showed that the recycled aggregates treated by cement paste developed high-water absorption. This strong absorption would be the consequence of the large thickness of the paste (old and new) surrounding the aggregates, this treatment also increased the absolute and apparent densities. The strengths of concretes based on cement paste-treated aggregates have developed equivalent resistances, or even higher than those of natural aggregate-based concretes and based on untreated recycled aggregates.

Keywords: *Mechanical strengths., Ordinary concrete, Water absorption, Cement paste treatment, Recycled aggregates*

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EVALUATION OF PROTEIN YIELD OF HYDROLYSATE AND PROTEIC ISOLATE EXTRACTED FROM THE COPRODUCTS OF SARDINA PILCHARDUS

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ABSTRACT

The impact of waste from fish processing on aquatic systems can vary greatly depending on the type, quality and frequency of releases. Our work aims to recover the waste (bones, heads and guts) of the common sardine "Sardina pilchardus". First, the coproducts were being used in the preparation of chemical and enzymatic hydrolysates and protein isolate for industrial interest. Then, the protein determination was performed by the Kjeldahl method. The results indicate that the extraction yield of the enzymatic hydrolysate is the highest (29.4%). Thus, the enzymatic hydrolysate (trypsin) has a higher protein levels per input to other hydrolysates (acid) and autolysate. While the protein isolate obtained representing a yield of 7.23%. For the protein isolate, the percentage of the calculated nitrogen was 31.52%. The enzyme hydrolysate (trypsin) showed a yield of proteins (9.63%) higher contribution by other hydrolysates (acid) and autolysate. Through physicochemical analyzes, the isolate obtained has a high biological value (rich in essential amino acids). The variability of these coproducts has strengthened several areas. This work allowed presenting a way of management and valorization of the rejections of various industries of fish processing, thus making it possible to reduce the risks of pollution and consequently, a contribution to the preservation of the littoral environment.

Keywords: *Sardina pilchardus, Isolate, Hydrolysate, Coproducts, Waste.*

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CONVERSIO PHOTOCATALYTIQUE DU CO2 SUR L'OXYDE DE CUIVRE (CUO) SUPPPORTE SUR DES SPHERES DE CARBONE (CSS)

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ABSTRACT

Dans cette étude, nous avons examiné la performance des nanoparticules de cuivre (CuO) déposés sur des sphères de carbone (CSs)Â , sur la conversion photocatalytique du dioxyde de carbone (CO2) en milieu hydrogenocarbonaté saturé en CO2 (NaHCO3/CO2, KHCO3/CO2). le support (CSs) et le catalyseur (Cu-CSs) ont été préparés par le procédé de dépÃ´t chimique en phase vapeur, et le procédé de dépÃ´t-précipitation homogène respectivement. Le catalyseur a été caractérisé par différentes techniques physico-chimiques telles que la diffraction des rayons X (XRD), Raman, l'infrarouge Ã transformée de Fourier (FTIR), la réflectance diffuse (RD), la conductivité électrique. Le catalyseur présentait une structure électromagnétique simple de CuO et nettement déposée sur les CSs. La propriété semi-conductrice a été établie par la mesure de la conductivité électrique (Ea=0,04 eV). Le spectre d'absorption UV-visible montre une transition directe (Eg= 1,22 eV). Le catalyseur est de type p. La performance photo-catalytique du 10Cu-CSs a été évaluée par la mesure de la quantité de l'acide formique produite sous rayonnement visible sous différentes conditions opératoires.

Keywords: *catalyse, photo, CO2, sphères de carbone, acide formique, semiconducteur.*

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ETUDE SPECTROSCOPIQUE (SPECTROSCOPIE FT-IR) DE LA STRUCTURE FONCTIONNELLE DU CHARBON ACTIF ISSUS DES DE TRAITEMENT DES ALGUES BRUNES ACTIVEES PAR DIFFERENTS AGENTS CHIMIQUES

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ABSTRACT

Le charbon actif est un produit adsorbant possède une structure extrêmement poreuse avec une grande surface spécifique incrusté de plusieurs fonctions chimiques. Afin de comprendre les mécanismes d'adsorption mis en jeu, il est nécessaire d'étudier la structure fonctionnelle de cette surface active. Ce travail a été consacré à l'étude du développement de cette structure par une technique spectrale : spectroscopie infrarouge à transformé de Fourier FT-IR qui s'intéresse aux transitions vibrationnelles et à la détermination des groupements fonctionnels dans les molécules. Au laboratoire SEA2M, nous développons des charbons à partir de la biomasse végétale comme les algues brunes (Biomasse marine) existantes sur la côte de Mostaganem qui a donnée une bonne capacité d'adsorption pour les polluants organiques et inorganiques. L'étude de l'évolution de la structure fonctionnelle de ces algues traitées par différents agents d'activation (Traitement par HCl et traitement par CaCl2) a montré le une différentiation remarquable dans les groupements fonctionnels développés dans cette structure.

Keywords: *Charbon actif, Spectroscopie FTIR, Adsorption, Groupements fonctionnels*

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CYCLOHEXANONE OXIDATION USING CESIUM KEGGIN-TYPE HETEROPOLYSALTES CATALYSTS

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ABSTRACT

Cyclohexanone oxidation was carried out at 90 °C in free solvent, using Keggin-type polyoxometalates and hydrogen peroxide system under soft and green conditions. The studied polyoxometalates as catalysts are Cs3PMo12O40 and CsAPMo12O40(A: Sb, Sn, Mn or Co). The effects of reaction temperature and the catalyst chemical composition were examined. HPLC analysis of reaction mixture showed that adipic acid (AA) is the main product followed by epsilon caprolactone (ε-CL) as secondary product. The tin based-salt (CsSnPMo12O40) led to the highest AA and ε-CL yields with 50% and 18% respectively. From the different catalytic tests and catalyst characterization results, reaction pathways have been proposed. The active species could be peroxo-polyoxometalates. Our results can be a good greener and economical way to adipic acid production

Keywords: *cyclohexanone, adipic acid, Polyoxometalates, green chemisty*

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REMOVEL OF DRUGS FROM HOSPITALS WASTEWATER BY NANOMATERIAL OF CYCLODEXTRIN-MORINGA

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ABSTRACT

To preserve the environment from drug residues spilled into the water, we developed a new cyclodextrin-based material that was moringa-like. The latter has the capacity to treat water loaded with hospital drugs. Hospital wastewater (WWs) represents a particular type of effluent, in compared with the urban wastewater. Hospitals generate on average 750 L of wastewater by bed and by day so they are 2-5 times higher than urban flow rates, which refer to one inhabitant equivalent (typically included in the interval 120-250 L). This significant quantity of water per day, for the different purposes and services depending on the activities which take place within the structure. Â

Keywords: *Photodegradation, Hospital effluents, drugs, Nanocomplex.*

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EFFECT OF TUBE CONFIGURATIONS ON VERTICAL CLOSED-LOOP GEOTHERMAL HEAT EXCHANGERS SIZING FOR RESIDENTIAL APPLICATION

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ABSTRACT

Ground source heat pump (GSHP) system is one of the promising applications in the green power technology; it is gradually gaining attention and will have wide applications in the future of geothermal energy. The closed ground source heat pump systems are one types of ground source heat pump (GSHP) systems and are classified as low enthalpy geothermal systems since they make use of low temperature differences, it consists of heat exchanger loops that utilize the heat conduction mechanism of the ground to reject or extract heat. In this paper, the study was conducted to examine the influence of tube configurations (configurations B and C) on the design of a vertical closed loop for a residential unit under the meteorological conditions of Ouargla, city located in the south-west of Algeria, using analytical design procedure (ASHRAE), which highlight the influence of heat exchanger properties and ground parameters. After the building loads calculations which were done using the TRNSYS simulation software , the comparison between the two identified types of tubes locations was performed. The results indicate that the depth of the GHX is significantly influenced by the position of tubes , a difference in the GHE depth exceeds10 m between B and C configurations.

Keywords: *geothermal energy, vertical closed loop, Ground Heat exchanger, source heat pumps, Ground, low enthalpy system.*

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EFFECT OF THE DEPOSITION TEMPERATURE OF CUO-CU2O SYSTEM BY CHEMICAL SPRAY

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ABSTRACT

In the present work, CuO-Cu2O thin films were deposited on cleaned glass substrates with various temperature namely (200°,260°,320°,380°,440°,500°) by spray technique. To investigate the influence of the deposition temperature on the structural, optical and electrical properties of CuO-Cu2O thin films, the resulting films were characterized by means of X-ray diffraction, UV-visible spectrophotometer, photocurrent. X-ray diffraction analysis indicated that copper oxide (CuO) thin films prepared has polycrystalline structure and when increase the temperature of thin film over than 440° C ,the thin film turns from phase Cu2O to CuO phase. The optical studies showed that the gradual decrease in the transmittance of the layers with the increase of the deposition temperature. In conclusion, we have been able to developÂ thin layers of copper oxide CuO-Cu2O system) by a simple chemical method and the properties of the considered interesting and motivating.

Keywords: *photocurrent. X, spray technique, thin films, ray diffraction*

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SYNTHESIS OF ZNS THIN FILMS BY ELECTRODEPOSITION FOR SOLAR CELL APPLICATIONS

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ABSTRACT

The deposition mechanism of binary alloys used in the synthesis of photoactive ZnS thin films has been studied by means of electrochemical techniques. The ZnS films have been electrochemically deposited on ITO substrate from acidic medium (pH 3.5-4.5), containing tri-sodium citrate as complexing agents. The as-deposited thin films were characterized by means of scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDAX) techniques to investigate their morphological and compositional properties. Uniform deposits of large grains are formed depending on the experimental conditions.

Keywords: *Photovoltaics, Semiconductor, Solar cells, Electrodeposition, Thin films, ZnS alloys*

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BIOLOGICAL REMEDIATION OF THE HYDROCARBONS-CONTAMINATED SOIL

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ABSTRACT

L'impact de la pollution par les hydrocarbures devient de plus en plus important. Il est donc nécessaire de décontaminer les environnements pollués. La remédiation biologique est une alternative très intéressante. L'objectif de cette étude était d'évaluer le potentiel de biodégradation du diesel par les bactéries aérobies isolées par la technique d'enrichissement à partir de sols contaminés provenant de la raffinerie d'Arzew en Algérie. Les souches bactériennes isolées ont été identifiées par leur morphologie coloniale, leur morphologie cellulaire et leurs caractéristiques biochimiques et ont été caractérisées moléculairement selon un procédé de séquençage des gènes codant pour l'ARNr 16S (ADNr). Les isolats ont été identifiés comme étant Pseudomonas aeruginosa (P1) et Pseudomonas putida(P4). La capacité des souches isolées à dégrader le diesel a été réalisée en milieu liquide en mesurant la densité optique, la concentration en microbilles (UFC / ml), la concentration en hydrocarbures de pétrole totaux (TPH), la DCO et la DBO5. La dégradation de l'isomérat a été analysée par chromatographie en phase gazeuse avec détecteur à ionisation de flamme (FID). Les résultats indiquent que les souches isolées peuvent être utilisées en diesel en tant que sources de carbone simples, o¹ la biodégradation a été définie par une augmentation de la densité optique, de la concentration microbienne (UFC / ml) et une diminution des TPH, DCO et DBO5. Pseudomonas aeruginosa (P1) présente la plus grande capacité de dégradation du diesel; cela concordait avec la dégradation complète de quatre composants de l'isomérat (C3, I-C4, 2-3-diméthylbutane et toluène).

Keywords: *Isomerate, diesel, Biological remediation, aerobic hydrocarbon, degrading bacteria*

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ELABORATION AND CHARACTERIZATION OF CUINZNSE QUATERNARY THIN FILMS

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ABSTRACT

The quaternary compound was synthesized by two steps, the first consists of depositing Cu, In, Zn and Se sequential layers on each other on soda glass slides using the thermal evaporation technique. under vacuum 6.10-6 mbar. Then the metal alloy undergoes in-situ annealing by halogen lamp in order to realize the CuInZnSe2 absorber. Chalcopyrite structure, polycrystalline nature, film homogeneity and sociometry were shown by DRX, MEB, AFM and EDX respectively. The grain size in the films was around 44.5 nm for 650 nm thick films. The visible UV gave us an absorption coefficient around Î± = 4.104 cm-1 and a gap around Eg = 1.4 eV.All these results confirm that our compound is a very good candidate to be used as an absorbing layer in a photovoltaic structure.

Keywords: *CuInZnSe2, Chalcopyrite, Photovoltaic*

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EFFICIENCY OF PEROVSKITE SOLAR CELLS AS FUNCTION OF ACTIVE LAYER, HOLE AND ELECTRON TRANSPORT MATERIALS

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ABSTRACT

Perovskite solar cells have attracted significant attention due to their excellent efficiency reaching 23%. it is a low cost technology with high efficiency. The structure of the classical perovskite cell is transparent electrode (FTO)/ electron transport layer (TiO2)/ perovskite material/ hole transport layer (spiro-OMeTAD/metallic electrode (Au). The parameters of the perovskite solar cells depend on the structure and the architecture of the cells; on the type of the active layer called absorption layer, the type of material used for transporting holes, the material used for electron transport, the solvents used to prepare the layers and the fabrication methods. Modification of the interface perovskite/interfacial layers enhance the power conversion of the cells. perovskite solar cells are very sensitive to moisture, the presence of moisture causes cell degradation and the reduction of their performance. New architectures of electrodes oxide /metal/oxide are proposed to improvre electrical parameters of the cells. In this work we present the current status of the photovoltaic performances of perovskite solar cells and the solutions envisaged for improving the conversion efficiency and the stability of this cells.

Keywords: *electrodes, hole transport layer, electron transport layer, stability, Perovskite, Photovoltaic cells, improvement.*

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MECHANICAL BEHAVIOR OF SANDWICH STRUCTURES MADE OF ALGERIAN ALEPPO PINE WOOD AND AGGLOMERATED CORK

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ABSTRACT

The objective of this article is to analyze the viability of using cork-based material as core materials in building applications. The use of cork-based material is proposed because of its isolation properties (both thermal and acoustic) with a less wastage of energy in manufacturing and a better environmental integration, both in the transformation stage and in the end of life recycling stage. The objective of this work is to study the mechanical behavior of different sandwich specimens, with Aleppo Pine wood faces, and agglomerated cork core with different thicknesses. The two bio sourced used materials are Algerian made. The mechanical behavior of the panels was tested for perpendicular compression and four point bending. The load-displacement curves and cracking fractures were analyzed. The wood present a resistance under four point bending test and the agglomerated cork present a high performance under perpendicular compression. Cork is a natural cellular material able to withstand considerable loads. The results suggested that these sandwich panels may be used as construction materials for partition walls in interior applications with the advantage of environmental friendliness and cost effectiveness.

Keywords: *Agglomerated cork, Aleppo Pine wood, Mechanical behavior, Sandwich panels*

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CATTLE MANURE CHARACTERIZATION BEFORE ANAEROBIC DIGESTION FOR THE OPTIMIZATION OF BIOGAS PRODUCTION AND ITS ENERGETIC VALORIZATION IN AN AGRICULTURAL EXPLOITATION

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ABSTRACT

Among the problems caused by agricultural and livestock activities in rural areas in the Algerian territory, the one concerning the animal dung is the most crucial, because they are at the origin of olfactory nuisance and pollution, as a solution we propose the methanisation that corresponds perfectly to the policy of sustainable development, the biogas produced by the fermentation of cattle manures contains between 40% and 60% of methane which gives it fuel character and its valorization allows energy conservation while protecting the environment by reducing green house gases emission. This contribution is dedicated to the chemical-physic characterization of the cattle manure produced in a local farm located in the region of Tizi ouzzou , with a view to estimating their energy capacity, which is necessary for the sizing of a micro-cogeneration adapted to the farm / rural area, provided that this sector is autonomous and works optimally.

Keywords: *Organic wastes, Manures, Biogas, Anaerobic digestion , Methanisation*

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Topic 4: Materials Manufacturing and Processing

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EFFECT OF BORON INCORPORATION ON THE STRUCTURAL AND OPTOELECTRONIC PROPERTIES OF ALAS BINARY COMPOUND AT HIGH HYDROSTATIC PRESSURE

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ABSTRACT

An investigation of the structural and optoelectronic properties of the Bx Al1-xAs ternary alloys compounds under high pressure has been performed by using the first-principles calculations based on density functional theory. The effects of the Boron concentration on the lattice parameter, bulk modulus, the brittleness and ductility of the Bx Al1-x As have been studied. The energy band gap of the binary compound AlAs and BAs is the indirect nature while their ternary Bx Al1-xAs alloy has a direct band gap.At higher pressure, the energy band gap decreases and the spectra of the complex dielectric shifted slightly to higher energy. The AlAs and B0.25 Al0.25 As are mechanically instable beyond pressure values 12GPa and 42.6GPa respectively. The Bx Al1-xAs materials are suitable candidate for application in optoelectronic devices due to their adjustable and narrow bandgap.

Keywords: *Boron compounds, semiconductor under pressure, AlAs, BAs, DFT*

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SYNTHESIS OF HIGH SILICA ZEOLITES USING A COMBINATION OF PYRROLIDINE AND TETRAMETHYLAMMONIUM AS TEMPLATES

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ABSTRACT

High silica ferrierite (FER structure), ZSM-5 (MFI structure) and ZSM-39 (MTN structure) zeolites were successfully synthesized using pyrrolidine (Pyrr) and tetramethylammonium (TMA) as structure directing agents (SDAs), in absence of alkaline cation and fluoride medium. The effect of the relative amount of Pyrr-TMA and Si/Al molar ratio on the crystalline phases was investigated. When a mixed template system being used, the crystallization was accelerated by a factor of 2 times with an increase in size of the crystals obtained, TMA+ would then play a generally beneficial in the crystallization spicily for FER and MFI zeolites. The obtained products were characterized by XRD, 13C solid-state CP MAS NMR, TGA and SEM techniques. The XRD patterns confirmed the formation of pure zeolites with high crystallinity. 13C CP MAS NMR spectroscopy confirmed the incorporation of pyrrolidine and tetramethylammonium in the structure of FER and MFI zeolites. These two kinds of SDAs played a cooperative role in the crystallization of these zeolites. The role of pyrrolidine was to provide the initial nucleation and tetramethylammonium to provide both space-filling and basicity capacities.

Keywords: *Tetramethylammonium, Pyrrolidine, Dual templating, Zeolite synthesis, Characterization.â€Ž*

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VALORISATION DES GRAINES DE CAROUBE PAR PRODUCTION DE LA GOMME DE CAROUBE

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ABSTRACT

Le présent travail concerne le procédé de préparation d'une gomme de caroube qui est un galactomannane (polysaccharide), biopolymère très utilisé pour de nombreuses applications: excellent raidisseur et stabilisateur d'émulsions. L'absence de toxicité concède son emploie dans les industries textile, pharmaceutique, biomédicale, cosmétique, nutritionnelle et alimentaire. L'extraction de la gomme Ã partir de l'endosperme des graines, est un processus très lent et difficile, dÃ» principalement Ã la dureté du tégument. Pour l'obtention de cette gomme, la voie acide est la plus utilisée. L'originalité de ce travail réside dans la méthode par voie aqueuse utilisée pour la purification du produit. Cette méthode nous a permis d'obtenir des galactomannanes purs et plus clairs. Le rendement de l'endosperme de la première méthode (par voie acide)Â était de l'ordre de 36.38â„…, par contre le rendement de l'endosperme de la deuxième méthode (par voie aqueuse)Â était de l'ordre de 49.50â„….La méthode par voie aqueuse s'avère intéressante du point de vue rendement qui se trouve augmenté de 26%. La gomme brute et la gomme purifiée ont été caractérisées par plusieurs techniques: caractérisations chimiques, spectroscopie infrarouge (IRTF), l'analyse thermogravimétrique. L'analyse IRTF a confirmé que le composé majoritaire de la gomme de caroube est le galactommanane. Les taux d'humidité varient entre 10 Ã 13%. Ceci montre que la gomme de caroube préparée par les deux méthodes est hautement hydrophile. Ces résultats sont en corrélation parfaite avec ceux obtenus par l'analyse thermogravimétrique.

Keywords: *Extraction, Gomme de caroube, Graines de caroube, biopolymère.*

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EFFECT OF THERMO-MECHANICAL TREATMENT ON SPRINGBACK DURING STRETCH-BENDING OF ALUMINUM ALLOY SHEETS

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ABSTRACT

There are several problems that occur during the sheet metal forming process, among them and the most important is the springback that causes the change of the final product shape. The quantification of springback has a significant role in the sheet metal forming industry. Therefore, in many cases the shape deviation is too large and springback compensation is necessary. Our objective is to study the influence of thermo-mechanical treatments and anisotropy of aluminum alloy sheets on springback, using a type U device adapted to a tensile test machine. The results obtained show that these two parameters have a significant influence on springback.

Keywords: *anisotropy, heat treatement, stretchbending, springback*

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FORMULATION AND STABILITY ASSESSMENT OF WHEAT GERM OIL IN WATER EMULSIONS CONTAINING XANTHAN GUM AS A POLYMERIC STABILIZER

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ABSTRACT

To establish stable emulsions with natural harmless emulsifiers that are compatible with pharmaceutical applications remains a significant challenge. Therefore, the aim of this study was to formulate and characterize oil in water emulsions (O/W) stabilized by xanthan gum as an emulsifying biopolymer. Wheat germ oil was used as the oily phase as it contains high levels of bioactive vitamins and micronutrients. The influence of the added xanthan gum as a polymeric stabilizing agent on the stability, the flow behavior and physico-chemical characteristics of oil-in-water emulsions was investigated. The gelled emulsions obtained presented a homogenous aspect, a fluid consistency and creamy appearance. These emulsions showed very good physico-chemical stability for all polymer concentrations. However, the microbiological stability was only observed at 0.5% of xanthan gum concentration. The viscosimetric study showed that all the prepared emulsions exhibited a shear thinning flow behavior.

Keywords: *Emulsion, Emulsifying biopolymer, Xanthan gum, Stability.*

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PREPARATION ET CARACTERISATION D'UN MATERIAU SEMI-CONDUCTEUR POUR LA DEGRADATION PHOTOCATALYTIQUE DU PARACETAMOL DANS L'EAU

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ABSTRACT

Ce travail a pour objectif l'étude de l'élimination d'un produit pharmaceutique Â« le paracétamol Â» présent dans l'eau par photocatalyse hétérogène en utilisant le BaMnO3 comme catalyseur. Le semi-conducteur BaMnO3 a été préparé par vois nitrate. La caractérisation a été réalisée par DRX, FTIR, mesures de photoluminescences et méthodes électrochimiques. La spectroscopie infrarouge nous a permis de mettre en évidence les différentes liaisons présentes dans le semi-conducteur préparé. L'étude optique a montré que le BaMnO3 présente une transition directe. L'extrapolation de la partie linéaire permet de déterminer la valeur de l'énergie de la bande interdite qui est de 2,13 ev. L'étude électrochimique nous a permis d'identifier les pics d'oxydo-réduction ainsi que les paramètres de corrosion. La mesure de capacitance a confirmé la conductivité de type n et a permis de déterminer le potentiel de la bande plate, qui est un paramètre crucial pour l'établissement du diagramme énergétique et pour la prévision des photo-réactions interfaciales. Ensuite, ce semi-conducteur est utilisé pour la dégradation du paracétamol présent dans l'eau sous illumination solaire. Les différents échantillons sont analysés par spectrophotométrie UV-visible et par chromatographie liquide Ã haute performance (HPLC). Enfin, une étude de la cinétique de réaction photocatalytique du paracétamol a été réalisée en faisant plusieurs prélèvements dans le temps. Cette étude a pour objectif de déterminer le temps nécessaire pour atteindre la demi-dégradation et d'accéder ainsi au temps de dégradation totale et Ã la constante de vitesse. Les remarques suivantes sont déduites : - La photocatalyse par irradiation du BaMnO3 est très efficace avec un rendement de 88,14% et un faible taux d'adsorption. - Apparition de nouveaux pics sur le chromatogramme de la solution de photocatalyse qui correspondent certainement aux produits de dégradation. - L'étude cinétique a montré que le paracétamol se dégrade avec une cinétique de premier ordre.

Keywords: *conducteur, semi, photodégradation catalytique, paracétamol, photocatalyse*

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INFLUENCE OF THE NITRIDING POTENTIAL ON THE KINETIC OF FORMATION AND GROWTH OF THE Î³' LAYER

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ABSTRACT

The study of the mechanisms of formation and growth of nitride layers from gaseous mixtures, at atmospheric pressure, containing ammonia and hydrogen, requires the control of the transfer of nitrogen to the solid gas interface. The flow of nitrogen transferred to the surface depends both on the thermodynamic and hydrodynamic behavior of the gaseous mixture used. In the present state, the growth kinetics of the layers in the iron-nitrogen system are generally well controlled both from the point of view of the thermodynamic data and the data of the solid-state transport phenomena. However, for industrial steels, the thermodynamic and kinetic interpretation of the formation of the different phases is much more complex. This work aims to present some experimental results of nitriding highlighting the influence of the nitriding potential KN and the treatment time on the kinetics of formation and growth of the combination layer Î³' formed on the surface of the 32CDV13 steel.

Keywords: *Gazeous nitriding â€“ Diffusion of nitrogen â€“ Potential of nitriding â€“ Layer growth kinetic.*

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INVESTIGATIONON THE FREE VIBRATIONAL BEHAVIOR OF THE FUNCTIONALLY GRADED BEAM

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ABSTRACT

This article present the free vibration analysis of simply supported perfect and imperfect (porous) FG beams using a high order trigonometric deformation theory. It is assumed that the material properties of the porous beam vary across the thickness. Unlike other theories, the number of unknown is only three. This theory has a parabolic shear deformation distribution across the thickness. So it is useless to use the shear correction factors. The Hamilton's principle will be used herein to determine the equations of motion. Since, the beams are simply supported the Navier's procedure will be retained. To show the precision of this model, several comparisons have been made between the present results and those of existing theories in the literature.

Keywords: *trigonometric deformation theory, vibration, porosity*

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POLYMERE DE SYNTHESE ANTIBACTERIEN APPLICATION REVETEMENT DU CENTRE DE TRANSFUSION SANGUINE

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ABSTRACT

Les matériaux de construction, notamment les revÃªtements en ciment de portland montrent leur limite. Ils sont Ã la base de foyers infectieux au niveau des hÃ´pitaux. Par ailleurs, ils sont imprenables pour toute forme de décontamination. Les franges murales, les retraits et les brisures constituent un réservoir de biofilms bactériens pathogènes Ã l'origine d'infections aéroportées. L'application des matériaux composites de synthèse comme revÃªtement spécifique répond aux exigences d'hygiène les plus strictes. Ils résistent aux chocs thermiques, chimiques et biologiques. Dans notre travail, Nous avons opté pour un revÃªtement en matériaux composites Ã base de polymères de synthèse. La tenue dans un environnement biologiquement actif Â« centre de transfusion sanguine de Blida Â» donne des résultats satisfaisant.

Keywords: *Ciment portland., Matériaux composites, Infection*

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MODELING AND SIMULATION OF CONDUCTANCEÂ€“VOLTAGE CHARACTERISTICS OF A NITRIDE GAAS SCHOTTKY DIODE

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ABSTRACT

In this work, an Au / GaN / GaAs Schottky diode was prepared using a radiofrequency nitrogen plasma source, followed by a study of different voltage-conductance characteristics (G / Ï‰-V) at room temperature of this structure. We have developed a simulation program to interpret the evolution of electrical characteristics in a Schottky structure based on nitrided GaAs. For this, we used a numerical model for calculating the G-V characteristics that can verify the experimental measurements made on the Schottky diodes. The geometric model of our structure must take into account not only the GaN layer formed between the metal and the GaAs substrate but also the density and distribution of trapped states within the band gap. The calculation principle of our program is based on the numerical resolution of the Poisson and continuity equations which makes it possible to calculate the electrostatic potential and the two concentrations of the n and p mobile carriers. These three parameters in turn are used to extract the electric charge and current and consequently the capacitance and the conductance. The simulation results were verified by the experimental measurements.

Keywords: *Trap states, Gâ€“V, MIS structure, surface nitridation*

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THE EFFECTS OF TITANIUM DIOXIDE AND CLAY NANOPARTICLES ON THERMAL, MECHANICAL ANTIBACTERIAL ACTIVITY OF PP/HDPE/CLAY/TIO2

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ABSTRACT

Blends of polypropylene (PP) and high-density polyethylene (HDPE) were prepared by reactive blending in the presence of dicumyl peroxide (DCP) as a free radical generator, maleic anhydride (MAH) as a cross-linking agent and organo-montmorillonite (O-Mt) as filler. Titanium dioxide (TiO2) was added as a anti UV agent known as well for its antimicrobial activity. This formulation was aimed to see how an incompatible blend will behave in the presence of the above cited ingredients and if it will have an anti-bacterial activity. The compounding of the ingredients was carried out in internal brabender mixer. The resulting materials were characterized using different techniques: dynamical rheological analysis (DRA), differential scanning calorimetry (DSC), fourier transform infrared spectroscopy (FTIR), atomic force microscopy (AFM), and mechanical testing. The results showed that the presence of titanium dioxide in the blends PP/HDPE leads to the destruction of the octahedral and tetrahedral structure of the clay (exfoliation form), results confirmed by FTIR analysis where it has been observed that the peaks associated with the octahedral structure have disappeared. AFM showed a smooth surface for the materials mainly those with high relatively organomontmorillonite content and TiO2 which showed improvement in their mechanical properties. Antibacterial efficiency of the composites depends on the dispersion and the concentration of the TiO2 particles and it was concluded that composites with either low or high content of TiO2 showed antibacterial property. Â

Keywords: *HDPE, TiO2, organomontmorillonite, PP, composite, Antibacterial activities.*

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THE INFLUENCE OF TITANIUM DIOXIDE IN THE PVK MATRIX ON ANTI-BACTERIAL PROPERTIES, ELECTRICAL RESISTANCE AND RESISTANCE TO UV RADIATION

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ABSTRACT

In the present study the poly (N-vinylcarbazole) (PVK) is doped with nano-crystalline titanium dioxide (TiO2). The solutions of the PVK-TiO2 and neat PVK in the DMSO were prepared, followed by a gradual evaporation of the solvent until the mixture became viscous. The viscous solution was drop-cast onto a pre-cleaned glass substrate (ITO). A polymer thin film was formed after slow solvent evaporation under ambient conditions for 12h. Thin films of PVK-TiO2 composites show a porous microstructure (SEM). The complexation and the ultraviolet resistance of the composite were confirmed by Fourier transform infrared spectroscopy (FTIR) and UV-Visible studies. The antibacterial activity was tested with various concentrations, 10-2M, 3.10-2M and 5.10-2M of doping, with Bacillus subtilis, Pseudomonas aeruginosa, Escherichia coli, and Staphylococcus. The electrical resistance of the samples of PVK and these complexes is based on the Automatic Mapping Four Point Probe System. Moreover, the TiO2 based Poly (N-vinylcarbazole) (PVK) exhibited a remarkable variation at higher concentrations as compared to that of the pure poly (N-vinylcarbazole) film. The antimicrobial activity against gram negative and gram positive bacteria increased with the increase in the concentrations of TiO2 and the maximum inhibition of bacteria growth was observed in PVK-TiO2(5.10-2M) composites with Escherichia coli. This is due to the higher concentrations of TiO2, activated surface area and better dispersion of TiO2 on PVK. The results of SEM confirm the presence of TiO2 in the composite, which consequently modifies the morphology of the film significantly.

Keywords: *ultraviolet resistance, Antibacterial activities, TiO2, ITO, PVK, composite*

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STATISTICAL ANALYSIS OF THE TENSILE PROPERTIES OF FIBER STRAND AND VASCULAR BUNDLE EXTRACTED FROM DATE PALM RACHIS

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ABSTRACT

The aim of this study is the valorisation of the huge residue amount of date palm rachis available in Algeria in order to be used as reinforcement in bio-composite materials for various industrial applications. The analysis of the morphology using scanning electron microscopy (SEM) of the cross-section of the date palm rachis allowed us to identify two main types of date palm fibres, namely: vascular bundles and fibre strands. The chemical and molecular structure analysis of the date palm rachis fibers was examined by Fourier transform infrared spectroscopy (FTIR). The mechanical properties of the fibre extracted were investigated under tensile loading test. The experimental results obtained of ultimate tensile strength, Young's modulus and strain at failure of the fibres have been analysed, in view of their dispersion, using the three-parameter and two-parameter Weibull. The tensile strength and Young's modulus of fibre strand were found about than four times higher than for vascular bundle. The comparison of the obtained tensile properties of the investigated fibre with other lignocelluloses fibres, existing in the literature, lead to show its great potential for use as reinforcement in bio-composite material.

Keywords: *Date palm rachis., Vascular bundle, Fibre strand, Statistical analysis, Tensile properties*

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STATISTICAL ANALYSIS USING WEIBULL METHOD OF JUTE YARNS LOADED UNDER TENSILE TESTS

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ABSTRACT

Nowadays, the world is facing a crisis in terms of renewable resources and a growing carbon footprint. For this reasons, the world is starting to use natural fibres as reinforcement in composite materials in various applications because of their many advantages, including their low cost, lightness and eco-friendly products, compared to synthetic ones. The aim of this paper is to study the possibility of jute fibre yarns as reinforcement in bio-composites materials for industrial application. To use these lignocellulosic fibres it is necessary to investigate their chemical composition and mechanical properties. The jute fibre yarns investigated are constituted from three yarns twisted with a certain angle and their diameter was determined using an optical microscope. The functional groups of the jute fibres yarns were studied by Fourier Transform InfraRed spectroscopy (FTIR) and their static tensile strength and strain at failure and Young's modulus were determined for 30 tests carried out using tensile tests machine having a capacity of 2.5 kN. In order to evaluate their mechanical properties and in view of their dispersions, a statistical analysis of the obtained experimental data was performed using two and three parameters Weibull method. The results of the jute fibre yarns were compared with house found in the literature.

Keywords: *Tensile properties, FTIR, Jute fibres yarns, Weibull 2 and 3 parameters.*

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EVALUATION OF MICROSTRUCTURE AND PROPERTIES DETERIORATION IN VEGETAL FIBER REINFORCED THERMOPLASTICS SUBJECTED TO HYDROTHERMAL AGING

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ABSTRACT

Hydrothermal aging of polymer matrix composites has attracted attention of researchers due to increasing practical needs such materials have been intensively used for many applications in humid environments. Water absorption and mechanical loading have been recognized as the major factors of degradation. These degradation processes leads to the deterioration of the mechanical and thermal properties of composite during long-term using. The understanding of the degradation mechanisms and their behaviour is indispensible for extending their service life. The main objective of this work is to study the hydrothermal aging of composites materials based on high density polyethylene (HDPE) matrix loaded with 30% wt of olive husk flour. To improve the interfacial compatibility, acompatibilizing agent is used: PE-g-MA, a commercial product at 5 % wt content. The samples were immersed in distilled water at 70 Â° C for 6000 h. The decohesion at the charge / matrix interface confirmed by images of the scanning electron microscope which is likely to contribute to the fall of the mechanical properties of the composite. This can also result in the formation of cavities and increase the water intake. The FTIR-ATR spectroscopy has shown a change of the chemical structure of the immersed matrix and composite materials. Increase in the mass of water absorbed until reaching a maximum value after 1200h of immersion then decrease. On the other hand, a slight increase in thermal stability is recorded as a function of the immersion time. The mechanism of increasing the thermal stability of composites with aging is not fully understood but it is often accepted that the filler creates a barrier and limits the diffusion of the products and also the presence of lignin in the filler and which acts as a thermal stabilizer.

Keywords: *Compatibilization, Vegetal fibers, Composites, Aging, hydrothermal*

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PREPARATION OF SILICA POWDER FROM ALGERIAN SILICEOUS SAND FOR SOLAR GRAD SILICON FABRICATION

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ABSTRACT

La lumière du soleil est la source la plus puissante parmi les sources d'énergie renouvelables. Les cellules solaires Ã base de silicium dominent l'industrie photovoltaÃ¯que en constituant plus de 90% des cellules solaires fabriquées aujourd'hui, car le silicium est l'élément le plus abondant dans la croÃ»te terrestre après l'oxygène. Dans le présent travail, nous parvenons Ã extraire de la silice de haute pureté (SiO2) du sable siliceux algérien. Nous avons amélioré le processus d'extraction chimique de la silice en utilisant un prétraitement acide, et nous avons également étudié l'effet de la moralité d'une solution d'hydroxyde de sodium (NaOH) sur la vitesse de dissolution du sable. Une analyse de fluorescence X a été effectuée sur les échantillons avant, pendant et après la purification chimique. Les résultats ont montré une diminution des concentrations en impuretés après la lixiviation Ã l'acide. La silice extraite a une pureté de 99,43%, dans notre cas, Â

Keywords: *solar grade silicon, Siliceous sand, Silica, solar energy.*

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ETUDE CINETIQUE DE LA BIOSORPTION DES ELEMENTS TRACES METALLIQUES PAR LES RESIDUS DU VINAIGRE DE CIDRE

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ABSTRACT

L'hydrosphère est de plus en plus contaminée par les niveaux croissants d'effluents industriels organiques et inorganiques, y compris les éléments traces métalliques . Ces éléments sont nuisibles aux Ãªtres vivants en raison de leur persistance, de leur toxicité, de leur accumulation et de leur non-biodégradabilité . La pollution de plus en plus grandissante du milieu aquatique par le cuivre a conduit Ã la mise en place de procédés performants de dépollution. Parmi ces procédés, on peut citer la biosorption. Dans cette étude, nous présentons les résultats obtenus relatifs Ã la biosorption du cuivre sur les résidus du vinaigre de cidre. Au préalable, la biomasse utilisée a été caractérisée par plusieurs méthodes physicochimiques (détermination du point de charge nulle , porosité, densité), spectroscopique et microscopique . Les différents tests de biosorption, en mode discontinu ont été réalisés en examinant les effets de plusieurs paramètres qui ont été tous optimisés. Ces paramètres sont la teneur en biomasse, le pH du milieu et du temps de contact. Le processus cinétique a été évalué en utilisant les modèles pseudo-premier, pseudo second ordre et le modèle de diffusion intraparticulaire. L'examen des résultats de l'étude cinétique a montré que le modèle du 2ème ordre semble le plus efficace pour décrire la cinétique avec un coefficient de corrélation très satisfaisant (R2 = 0,99). L'analyseÂ spectroscopique a confirmé la présence de groupes carboxyles et hydroxyles et leur implication dans la liaison métallique. Â Â

Keywords: *Les résidus du vinaigre de cidre, cuivre, biosorption*

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ANFIS, SVM AND ANN SOFT-COMPUTING TECHNIQUES TO ESTIMATE GLOBAL SOLAR RADIATION IN ALGERIA

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ABSTRACT

It is essential to have accurate information on global solar radiation for optimum design of solar energy conversion appliances. However, global solar radiation measurement is very rare in meteorological stations in Algeria. Hence, modeling global solar radiation is a crucial task to fill the gaps in database and to estimate global solar radiation in places where global solar radiation measurement is not available. The objective of this study is to assess the accuracy of three soft computing techniques (artificial neural network (ANN), support vector machine (SVM) and adaptive neuro-fuzzy inference system (ANFIS)) in predicting horizontal global solar radiation from measured meteorological in Algeria. The best model accuracy has been assessed determined using statistical parameters such as root mean squared error (RMSE), mean absolute error (MAE) and coefficient of determination (RÂ²). Results indicate that the ANN technique has better performance than the other techniques and may be a promising substitute to the usual approaches for estimating solar radiation.

Keywords: *neuro, support vector machine, Artificial neural networks, fuzzy inference system, Solar radiation.*

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STUDY OF THE INHIBITING POWER OF N- (2-HYDROXYBENZYLIDENE) ANILINE DIFFERENTLY ON THE CORROSION OF A STEEL .

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ABSTRACT

Â In this study, the effect of the addition of certain organic Schiff-based compounds on the corrosion of a carbon steel in hydrochloric acid medium was studied using the gravimetric method. These compounds are synthesized by condensation of salicylic aldehyde and aniline substituted by the methyl, chloro and nitro groups in the meta position. The effect of the concentration of the substances studied as well as the influence of the temperature and the duration of immersion time on their inhibitory behaviors were discussed. The results obtained show that our Schiff bases possess an interesting inhibitory efficiency reaching a maximum value at a concentration equal to 10-3M. The thermodynamic parameters resulting from the inhibitory effect of the molecules tested are calculated and an interpretation of the results obtained is explained. The correlation inhibitory efficiency-molecular structure and molecular reactivity indices was performed using the DFT method.

Keywords: *Schiff base, steel, Corrosion inhibition, DFT method.*

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AMELIORATION DES PROPRIETES A L'INTRFACE DES MELANGES PP/EVAR EN PRESENCE DE PE-G-MA

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ABSTRACT

L'objectif de ce présent travail est étudier l'effet de PE-g-MA sur propriétés thermiques d'un mélange polymériques Ã base de polypropylène (PP) et de l'éthylène acétate de vinyle recyclé. Les propriétés chimiques, thermiques et mécaniques des mélanges PP/EVAr préparés Ã l'état fondu en présence et en absence d'un agent de couplage (PP-g-MA) sont étudiés. Les résultats obtenus ont été discutés par rapport aux polymères de base. Le mélange PP/EVAr étant immiscible présente une mauvaise adhésion interfaciale, mais après addition du PP-g-MA, les conditions interfaciales sont améliorées, ce qui engendre une amélioration des propriétés thermiques et mécaniques.

Keywords: *Mélange PP/EVAr, PE, g, MA, FTIR, Propriétés mécaniques.*

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ELABORATION D'UN SYSTEME D'AIDE A LA DECISION POUR LE CHOIX DES CONFIGURATIONS DE CENTRALES A ENERGIES RENOUVELABLES.

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ABSTRACT

L'énergie renouvelable est le choix inévitable pour le développement durable de la société et de l'économie. Dans notre travail, les travaux de la recherche établissent une démarche en vue de proposer des solutions de choix des énergies renouvelables, cette problématique liée au dimensionnement des systèmes utilisés et le choix du meilleur système Ã mettre en Å“uvre. Cette approche sera développée par rapport aux critères définis. Les informations sur les variables économiques, la performance énergétique et l'impact sur l'environnement des systèmes sont actuellement des données dont l'analyse et la quantification posent des difficultés. Pour faire face Ã ce haut niveau de complexité et d'incertitude une approche évaluative est nécessaire. Comment sélectionner l'énergie renouvelable la plus appropriée pour un site isolé est un problème complexe de prise de décision multicritère (MCDM). Lorsqu'il y a plusieurs objectifs, il est impossible de les atteindre tous en mÃªme temps. Pour cela, plusieurs méthodes de prise de décision et système d'aide Ã la décision mis en Å“uvre permettent de passer d'une décision subjective (mono-critère) Ã une prise de décision objective basée sur plusieurs critères afin de formaliser et modéliser la préparation de la décision. Le but de cette étude est de déterminer le meilleur modèle d'énergie renouvelable pour un approvisionnement en énergie dans un site isolé de Bordj Cedria en Tunisie. Les décideurs adoptent une méthode Ã critère unique utilisant HOMER pour créer un système d'aide Ã la décision multicritères (OPEN-GAIN), utilisant les quatrièmes meilleurs modèles issus de HOMER. Ces modèles reposent principalement sur des critères d'ingénierie (économiques, sociaux et environnementaux) permettant de mieux OPEN GAIN DSS emploiera pour l'analyse la preuve de sa capacité Ã mettre en Å“uvre et de son utilité pour les différents acteurs lors de la réalisation d'une évaluation. En observant les résultats, il est apparu que le modèle (HES 41% WEC) s'avérait Ãªtre le meilleur modèle sur le site en utilisant le DSS multicritères intégré.

Keywords: *energie renouvelable, système hybride, open gain DSS, HOMER, MACBETH*

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NUMERICAL EVALUATION OF THE JIC TENACITY FOR STEEL A508

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ABSTRACT

The fracture is a mechanical process that produces a local discontinuity within a material, also called crack. There is often talk of initiation to rupture and propagation at fracture. We will distinguish two types of rupture; the first is a brittle fracture characterized by the absence of macroscopic plastic deformation which leads to a faster and more abrupt fracture (weak breaking energy), the second is a ductile rupture mainly due to the existence of inclusions or precipitated in the material, it is accompanied by the formation of a plastic zone in the vicinity of the tip of the crack before propagation (significant breaking energy). In this work, we propose a numerical approach on the calculation code abaqus for the determination of fracture toughness JIC. We take into account the experimental work of J.Wang and we model a test SENT considering three ratios of crack width on total width of the Test specimen. The results give a good satisfaction between the ductile damage model of Abaqus and the experimental results of J Wang.

Keywords: *abaqus, finit element, fracture, plasticity.*

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STUDY OF THE INFLUENCE OF AL AND SI ON THE HARDNESS AND THE MICROSTRUCTURE OF A HEAT RESISTANT STAINLESS STEEL

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ABSTRACT

The chemical composition of an alloy affects directly its deferent characteristics, for that, from a grade of a heat resistant stainless steel produced by ALFET of Tiaret, five deferent grades have been elaborated with industrial process by varying progressively the rate of Si from a side, and the rate of Al from another side. The samples were cut by water jet from the ingots of studied cast stainless steels and prepared with the deferent steps of polishing. For each sample, the chemical composition was analyzed with atomique absorption spectroscopy. The Brinell hardness was measured at room temperature and the microstructure was inspected with an optical microscope. The obtained results show that the hardness increase with the rise of the rate of Si, while she remains almost stable with the rise of Al rate. The microstructure has been affected in both of cases proportionally with the rise of Si and Al by the formation of ferrite and other intermetallic compounds

Keywords: *Heat resistant stainless steel, Hardness, microstructure.*

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EFFECT OF TREATMENT OF THE BARLEY STRAWS ON DESICCATION SHRINKAGE AND THERMAL PROPERTIES OF LIGHTWEIGHT SAND CONCRETE

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ABSTRACT

This experimental work focuses mainly on the study of the effect of different treatments of barley straw on the dimensional variation due to desiccation shrinkage, as well as the thermal properties of lightweight sand concrete. For this purpose, four methods of barley straw treatments have been used, such as: Oil for draining, hot water, varnish and diesel. In previous work, the optimal composition with untreated barley straw with a content of 15 kg/m3, has shown that the addition of straws alleviates sand concrete and gives it acceptable thermal properties. Nevertheless, it has shown a remarkable increase in shrinkage. The objective of this study is to further improve the properties studied and therefore to target the best treatment. The results obtained showed an interesting reduction of shrinkage for the treatment of straws with hot water, diesel and varnish. Improvements in shrinkage have been achieved, including a reduction of up to 21%. On the other hand, the treatment with the oil of draining gave an increase of the withdrawal compared to the concrete of sand based on untreated barley straw. It should be noted that even the thermal conductivity has been reduced, where the reduction is about 40%. Indeed, the straw treatments led to the increase of the Young's modulus and the tensile strength of the barley straw. Moreover, the study of X-ray diffraction gave a slight difference between the concretes studied. Finally, visualization under the microscope showed good adhesion between the straw and the cement matrix.

Keywords: *Thermal properties., Shrinkage, Treatment, Barley straw, Light sand concrete*

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FONCTIONNALISATION ELECTROCHIMIQUE DE L'OXYDE D'INDIUM DOPE A L'ETAIN (IN2O3 : SN) PAR REDUCTION DE 4-NITROBENZENE DIAZONIUM.

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ABSTRACT

Les applications optoélectroniques reposent souvent sur l'utilisation de l'oxyde d'indium-étain (ITO) comme matériau d'électrode transparent. Avant utilisation, ce substrat nécessite une amélioration de ses propriétés, notamment de transfert de charges inter-faciales. Pour cette raison, ils doivent subir une ou plusieurs modifications, devant Ãªtre robustes et contrÃ´lées et plus particulièrement, celle consistant a y accroché une molécule de faÃ§on covalente, souvent réalisé par électro-greffage d'un sel diazonium et dont nous nous somme intéressé. La diminution du courant lors de la chronoampérométrie, sur une électrode en ITO plongée dans un milieu aprotique contenant du 4-Nitrobenzènediazonium, indique l'électro-greffage de celui-ci aboutissant Ã la fonctionnalisation de l'ITO. Par rapport au substrat nu, le signal redox réversible du ferrocène est fortement perturbé. En effet, une diminution du courant des pics redox et une augmentation de leur écart de potentiel (Î”E), ont été observé lors de la voltammétrie cyclique. Ces observations confirment qu'une couche organique est attachée Ã la surface du substrat et agit comme une barrière pour les processus redox. De plus, cette couche fait augmenter la résistance de polarisation et fait diminue la capacité, dont les résultats ont été obtenus par spectroscopie d'impédance électrochimique. Ceci indique que la structure du film déposé est assez compacte, ce qui limite la perméabilité du couple redox pour atteindre le substrat (ITO) et y échangé les électrons. De plus, les spectres ATR-IR confirment la présence des groupements fonctionnels (-NO2,) sur la surface d'ITO fonctionnalisée.

Keywords: *voltammétrie cyclique, Nirobenzene diazonium, 4, ITO, Electrogréffage, chronoampérométrie, foncionnalisation de surface.*

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PREPARATION AND CHARACTERIZATION OF PHOTOCOMPOSITE BEADS (CALCIUM ALGINATE/ TITANIUM (IV) OXIDE): APPLICATION IN THE ADSORPTION/PHOTOCATALYTIC DEGRADATION UNDER SUNLIGHT IRRADIATION OF THE BASIC BLEU 41

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ABSTRACT

This study providing both, the preparation and the characterization of photocomposite beads named, the calcium alginate / the titanium (IV) oxide (CaAlg/TiO2), and the examination of their effectiveness in the adsorption/the photocatalytic degradation by choosing sunlight like a renewable energy, and the Basic Blue 41 (BB 41) like a model dye. The TiO2, the CaAlg pure beads and the CaAlg/TiO2 photocomposite beads were characterized using, X-ray diffraction (XRD), UVâ€“visible diffuse reflectance spectroscopy (UV-vis DRS), scanning electron microscopy (SEM), attenuated total reflection spectroscopy (ATR), thermogravimetry (TGA) derivative thermogravimetry (DTG) and X-Ray photoelectron spectrometer (XPS) analysis. Results showed that, the TiO2 was effectively dispersed and stabilized into the CaAlg matrix, as shown in Figure 1, and the CaAlg/TiO2 photocomposite beads revealed an improvement of the BB 41 adsorption efficiency (30 % for CaAlg/ TiO2 vs. 9 % for TiO2) and a same efficiency of the 96% for the BB 41 adsorption/photocatalytic degradation, compared to the TiO2.

Keywords: *photocatalytic degradation., adsorption, characterization, Photocomposite*

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DESCRIPTION OF CHARGE CONDUCTION PROCESSES IN DISORDERED CONJUGATED POLYMERS THROUGH TEMPERATURE DEPENDENT CONDUCTIVITY APPROACH

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ABSTRACT

Electrical conduction processes taking place in conjugated polymers are one of the research fields that shown intense research over the last two decades. Because these polymers are highly disordered, a proper description of which mechanisms governing the transport of charge is up to now under discussion. In the literature, it is reported that the temperature dependent electrical conductivity approach can be employed to elucidate the underlying mechanisms. In this communication, we report on the charge transport mechanisms in conjugated polymers that have been proposed in the literature so far. Several models will be presented such as the Mott's Variable Range Hopping (VRH), Kivelson, Efros-Shklovskii and others. In particular, we will describe and give the physical meaning of each of these models that depends on a number of parameters such as the degree of crystallinity and doping density of the studied sample. As an example, we show an experimental curve related to the temperature dependent conductivity measured on poly(o-methoxyaniline) (POMA) pellet in the temperature range of 20-290 K. Also, we have analyzed the data by the above mentioned models and we have found that the transport of charge can be described mainly by the VRH and Kivelson models

Keywords: *electrical conduction, Poly(ortho methoxyaniline), hopping*

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THE EFFECT OF ADDITIONS (KAOLIN DD3 + ALUMINA) ON THE SINTERING OF NATURAL FLUOROAPATITE.

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ABSTRACT

In recent years, significant progress has been made in the design and development of novel bone replacement biomaterials. New generation biomaterials are now able to bind to bone tissue and stimulate its regeneration process. Surgeons, chemists, biologists and physicists are working in close collaboration on this new generation of biomaterials that will allow medicine to continue to progress in the field of bone substitutes. Calcium phosphates have become established in the last twenty years in the field of biomaterials for orthopedic use. Calcium phosphates include Hydroxyapatite (HA) of formula Ca10 (PO4)6(OH)2 and Fluoroapatite (FA) Ca10(PO4)6F2, which have a composition and structure very similar to the mineral matrix of bone. In this work, several composite materials were prepared using natural phosphate (Fuoroaptite), kaolin and Alumina. Different mixtures were used by varying the (kaolin+alumina) content from 10 to 50 wt.%. All mixtures were milled by attrition milling for 1h and then pressed in cylindrical form. Finally, the green compacts were sintered between 1000 and 1400Â°C for 2 h of soaking. Reactions and phase transformations of the powder sintering were studied by X-ray diffraction, density, and open porosity, shrinkage, hardness and SEM analysis. From the X-ray patterns, we put in evidence the formation of some composites such as: Fluoroapatite-Yeelmite in the low concentrations and Fluoroapatite-anorthite in the high concentrations. The open porosity is decreased while the bulk density increases relatively with the increase of the sintering temperature. The correlation between morphological and mechanical properties is confirmed by Vickers hardness values, SEM imaging, and qualitative analysis using XRD. Â

Keywords: *Composites, Kaolin DD3, Fluoroapatite naturel, Frittage.*

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EFFECT OF THE ACTIVATING AGENT ON THE DEPOSITION OF TITANIUM OXIDE IN ACTIVATED CARBON

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ABSTRACT

Energetic materials degradation is considered as a major problem that can lead to uncontrolled explosions. In fact, this is due to the presence of NOx molecules that are released during the storage of these materials. Therefore, it is important to avoid the NOx accumulation in closed areas. This work proposes the preparation of activated carbons impregnated with titan oxide (TiO2) used for the retention of NOx by the photocatalytic process. Therefore, it is important to optimize some parameters in order to obtain the maximum adsorption, this later is directly related to the efficiency of the photocatalyst (TiO2) deposition. Two samples of activated carbons were prepared from olive residue, one activated with ZnCl2 and the second with H3PO4. TiO2 deposition is carried out using the high-temperature impregnation process. The textural and structural characterization of the elaborated materials and impregnated samples is carried out using nitrogen adsorption-desorption isotherms at â€“196 Â°C, Raman spectroscopy and X-ray fluorescence spectroscopy (XRF). The efficiency of the samples is tested by adsorbing the NOx vapours released during accelerated aging of nitrocellulose. The obtained results of the textural analysis showed that the elaborated activated carbons are porous with BET specific surfaces greater than 1100 m2/g, however the sample activated with ZnCl2 has more microporosity than the one activated with H3PO4. Furthermore, the deposition of TiO2 was confirmed by Raman and XRF spectroscopy. Actual NOx tests show that the activating agent is a crucial parameter that influences TiO2 deposition and the efficiency of the final material.Â

Keywords: *impregnation, activated carbon, Titanium oxide (TiO2), NOx*

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PREPARATION ET CARACTERISATION DE L'OXYDE DE GRAPHENE EN VUE DE SON UTILISATION DANS LE TRAITEMENT DU LIXIVIAT

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ABSTRACT

Les lixiviats des décharges sont des effluents liquides résultants de la percolation de l'eau de pluie Ã travers les déchets solides, ils sont connus par leurs fortes charges polluantes et leurs nocivités pour l'environnement [1]. Ce travail consiste Ã préparer un matériau adsorbant (Oxyde de graphène) en vue de son application pour la réduction du degré de pollution du lixiviat issu du centre d'enfouissement technique de Corso (wilaya de Boumerdès). Notre matériau a été préparé par la méthode de hummers [2] en se basant sur l'oxydation complète de graphite pur parÂ KMnO4 en présence de NaNO3 et de H2SO4. Une fois préparé, notre adsorbant a fait l'objet d'une caractérisation par des différentes techniques d'analyse. Les résultats obtenus par la diffraction des rayons X (DRX) montre que la structure de l'oxyde de graphène est cristalline, la microscopie électronique Ã balayage (MEB) complété par la microscopie Ã force atomique (AFM) révèlent lâ€˜existence des pores de différents diamètres sur la surface du matériau préparé, quand Ã la spectroscopie Ã rayons X Ã dispersion d'énergie (EDS) donne la teneur en éléments contenus dans l'adsorbant préparéÂ : 74.98 % de carbone et 23,39 % d'oxygène . Etant donné la charge polluante très élevé du lixiviat, l'oxyde de graphène synthétisé sera utilisé en vue de réduire la concentration des polluants présents dans cet effluent par des procédés physico-chimiques tels que l'adsorption.

Keywords: *valorisation, caractérisation, Oxyde de graphène, lixiviat*

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HETEROGENEOUS CATALYTIC CYCLOHEXENE OXIDATION TO CYCHOHEXAN-1,2 DIOL WITH POLYOXOMETALATE CATALYSTS AND HYDROGEN PEROXIDE

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ABSTRACT

A new heterogeneous catalyst (PVW/Bentonite), consisting of vanadium substituted tugstophosphoric acid with Keggin structure H4[PVW11O39].11H2O (PVW) supported on acid activated Bentonite (clay from Hammam Boughrara, Maghnia, Algeria), was prepared by witness impregnation and characterized by X-ray diffraction, BET, Fourier-transformed infrared spectroscopy, 31P NMR, UVâ€“vis diffuse reflectance spectroscopy and thermogravimetric & differential thermal analysis (TGâ€“DTA). X-ray diffraction indicated that PVW was properly loaded on Bentonite as a support. Heterogenization of homogenous catalysts is really interesting, as heterogeneous catalysts are recoverable. Optimum conditions were determined using surface response design (D-optimal design) in which catalyst weight, catalyst loading, reaction temperature, time and the molar ratio Cyclohexene/H2O2 were varied. A second order polynomial equation is developed to relate the responses and operational variables. The fitted model shows a good agreement between predicted and actual responses. Furthermore, by employing a regression analysis, an empirical model was developed to predict the recovery yield in the studied range of conditions.

Keywords: *optimization, polyoxometalates, oxidation, Cyclohexene, experimental design*

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AMELIORATION DES PROPRIETES IGNIFUGEANTES DES MELANGES PP/EVAR

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ABSTRACT

L'objectif de ce présent travail est l'étude des propriétés thermiques et mécaniques d'un mélange polymériques Ã base de polypropylène (PP) et de l'éthylène acétate de vinyle recyclé (EVAr) en ajoutant des retardateurs de flammes. Le rÃ´le de l'agent ignifugeant est avant tout préventif, ce dernier a un rÃ´le protecteur qui consiste Ã améliorer la stabilité thermique ainsi que le comportement au feu d'un matériau en évitant ou en retardant son inflammation. Dans cette étude, deux ignifugeants ont été introduit dans les mélanges PP/EVAr: la Cloisité 30B et le phosphore rouge. L'introduction des ignifugeants dans le mélange PP/EVAr a permis d'améliorer la stabilité thermique de ce dernier. Par ailleurs, l'ajout de la C30B, augmente la rigidité des mélanges. Quant Ã l'introduction du phosphore rouge au mélange PP/EVAr comme ignifugeant, diminue sa rigidité et augmente la ductilité.

Keywords: *C30B, Mélanges des polymères PP/EVAr, phosphore rouge, TGA/DTG.*

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CHOICE OF CUTTING PARAMETERS FOR MACHINING COMPOSITE MATERIALS USED IN FISHING BOATS

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ABSTRACT

This paper presents an experimental study on the choice of cutting parameters for machining composite materials used in fishing boats. The studied material is a four-layer unsaturated glass/polyester composite. To evaluate drilling defects, we made holes with various diameters of drills and milling cutters using three feedrates and three rotation speeds. The tests results and observations made gave significant damage to the vicinity of the holes, at the exit of the tool, that are proportional to the diameter of the tools. The area of damage around the holes caused by delamination is reduced using the drill rather than the cutter. In addition, static tests of four-point bending with a hole in the middle of the test piece are carried out for the diameters already used. The results of these tests have proven that increasing the feedrate has a negative effect on the mechanical properties of the plates.

Keywords: *composite, drilling, cutting parameters, delamination, fishing boat*

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SYNTHESE ET CARACTERISATION DE RESINE PHENOLIQUE - FORMALDEHYDE

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ABSTRACT

La résine principale utilisée dans la fabrication du contreplaqué dans le monde entier est de type résine phénol-formaldéhyde résol (PF). Ces résines peuvent Ãªtre polymérisées en plusieurs étapes et présentent des propriétés de charbonnement très élevées. Seulement, ces résines sont principalement synthétisées Ã partir de formaldéhyde et de phénol. La matière première de ce type de résine est dérivée de l'huile de pétrole. En raison de la hausse des prix du pétrole brut et de la rareté des produits pétroliers, leur remplacement par des matières premières basées sur les ressources naturelles. Dans le présent travail, la possibilité de remplacer le phénol dans la résine PF par de la lignine a été extraite de la fibre Alfa par extraction. Les conditions optimales pour extraire la lignine d'Alfa hydroxyde de sodium Ã 5 mol / L avec une température maintenue Ã 100Â°C pendant 7 h .Un gÃ¢teau de lignine (166,5 g) a été obtenu avec une teneur en solides de 33%. Des résines de phénol â€“ formaldéhyde ont été synthétisées en utilisant la lignine résultante en remplacement du phénol, Les paramètres de préparation de résine PF (LPF) Ã base de lignine des fibres Alfa, tels que la concentration en lignine, le rapport molaire formaldéhyde / phénol, la concentration en catalyseur, la durée de réaction et la température de réaction, ont été optimisés. Il a été trouvé que la lignine peut remplacer jusqu'Ã 50% en poids de phénol pour donner un adhésif LPF ayant une meilleure force de liaison par rapport Ã celle de la résine PF témoin. Les résines préparées ont été caractérisées par FTR DSC et ATG.

Keywords: *résine, lignine, phénol, formaldéhyde, Fibre Alfa, caractérisation chimique*

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ROBUST FAULT DIAGNOSIS USING UNCERTAIN HYBRID BOND GRAPH MODEL: APPLICATION TO CONTROLLED HYBRID THERMO-FLUID PROCESS

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ABSTRACT

The continuous increase in engineering systems complexity and industrial safety requirements has led to rising interest for the development of new Fault diagnosis algorithms. This paper addresses the fault diagnosis problem of uncertain hybrid systems containing both discrete and continuous modes using a hybrid bond graph (HBG) approach. The latter provides through its properties, an automatic Global Analytical Redundancy Relations (GARRs) generation. The numerical evaluation of GARRs yields fault indicators named residuals, which are used to verify the coherence between the real system behavior and reference behavior for real-time diagnosis. In fact, the residual is compared to its adaptive thresholds to detect the actual faults. In addition, the Global Fault Signature matrix (GFSM) allows making a decision on fault isolation. The main scientific interest of the proposed method remains in integrating the benefits of the HBG with the approach for adaptive thresholds generation for systems having uncertain parameters and measurements. For this task, first, the HBG model is obtained to model the hybrid system using the controlled junctions taken into consideration discrete modes changes. Secondly, the parameter and measurement uncertainties are modelled directly on the HBG in preferred derivative causality for residuals and adaptive thresholds generation. The proposed methodology is studied under various scenarios via simulation over a controlled hybrid thermo-fluid two-tank system.

Keywords: *Thermo fluid process., Uncertainties, Hybrid bond graph, Diagnosis, Automation engineering*

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IMPROVEMENT OF THE ARCHITECTURAL FRAMEWORK OF THE CITY BY TRANSFORMATION OF BUILDINGS TO ECO-ENERGY BUILDINGS (CITY OF BATNA)

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ABSTRACT

A significant portion of the total primary energy is consumed by current buildings in the city of Batna. In many of these buildings, energy consumption can be significantly reduced by adopting energy efficiency strategies. Due to environmental concerns and the high cost of energy in recent years, there has been renewed interest in the energy efficiency of buildings. The aim is to carry out an exhaustive technical review of the components of the building envelope and the corresponding improvements from the point of view of energy efficiency because the majority of its building envelopes have been realized without taking into account the modalities. Heat transfer and thermal insulation techniques. The use of different types of industrially prefabricated energy-efficient walls as demand is addressed for such benefits; efforts are needed not only in the choice of appropriate technologies, but also in the selection of appropriate materials. Different types of thermal insulation materials are listed, as well as selection criteria for these materials. The application of thermal mass as a method of saving energy. Air tightness and infiltration of building envelopes is the subject of discussion as they play a crucial role in the energy consumption of buildings. Energy efficiency approaches may sometimes not require additional capital investment. A holistic approach to energy-efficient building design can reduce the use of mechanical systems and offset the additional cost of energy efficiency functions and improve the architectural quality of urban building facades.

Keywords: *Prefabricated Wall, Building Energy Saving, Building Envelope, Urban Facade, Passive Techniques, Thermal Insulation*

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ELABORATION ET CARACTERISATION D'UN MATERIAU POREUX ACTIVE PAR L'ACIDE DE CITRON POUR L'ELIMINATION DE LA MATIERE ORGANIQUE DES SOLS.

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ABSTRACT

Notre travail consiste à utiliser un nouvel adsorbant naturel biodégradable à base d'un résidu naturel tel que les coques de noix et cela pour la rétention des substances humiques(SH). La synthèse d'obtention du matériau organique est: le nettoyage, séchage, broyage, tamisage et enfin un traitement thermique et une activation chimique par l'acide de citron. La caractérisation du matériau a été déterminée par la technique de spectroscopie infrarouge IR-TF ainsi que par diffraction des rayons X (DRX). Plusieurs paramètres réactionnels ont été étudiés afin d'optimisé les conditions idéales pour une bonne adsorption du polluant étudié; notamment, la température, la vitesse d'agitation, le temps de contact, et la masse du matériau. Les résultats que nous avons obtenus indiquent que le biomatériau permet une bonne rétention des SH après 45 minutes de contact. Un accroissement de rendement est aussi noté lorsque la masse du matériau = 20mg, pour la vitesse d'agitation égale à 300tr/min et la valeur optimal de la température = 40 °C (le rendement maximal d'adsorption est 91.6%). L'étude de l'isotherme montre que les modelés de Langmuir et Freundlich décrit bien le processus d'adsorption de la substance humique avec des coefficients de corrélation linéaires arrive à 97%. Le modèle de pseudo-second-ordre est le modèle établi dans cette étude, pour simuler la cinétique d'adsorption de la SH sur le matériau activé, avec un facteur de corrélation R2=0.98.

Keywords: *porosité, coques de noix, polluant, activation, Matériau poreux, caractérisation.*

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ELABORATION ET CARACTERISATION D'UN BLENDE A BASE DE PHBV/PP

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ABSTRACT

Les mélanges de polymères sont intéressants car leurs propriétés dépendent des polymères parents, propriétés que l'on peut donc faire varier avec la composition du mélange. L'objectif de notre travail est d'étudier l'élaboration et caractérisation d'un blende Ã base de PHBV/PP et une étude sur les relations structure/propriétés de mélanges PHBV/PP préparés par voie solvant sur toute une gamme de composition. Les échantillons ont été caractérisé par différentes analyses tel que l'analyse spectroscopie infrarouge a la transformé de Fourier (IRTF) et analyse thermogravimétriques (ATG/DTG). Les résultats ont montré que La spectroscopie infrarouge (IRTF)Â des mélange PHBV/PP non plastifié Ã montrer l'absence de toute réaction dans ces mélange alors que les spectres des mélange PHBV/PP plastifié ont mis en évidence d'existence d'interaction entre les différentes constituants. L'analyse thermogravimétrique a montré que le PP possède une grande stabilité thermique comparé au PHBV. Concernant les mélanges PP/PHBV non plastifiées possède aussi une stabilité thermique comparé aux mélanges plastifiés.

Keywords: *Blend, PHBV, PP, Polymèrs, Propriètés thermique.*

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MINIMISATION DE LA RUGOSITE DE SURFACE ET MAXIMISATION DE VOLUME DE COUPEAU ENLEVE LORS DE L'USINAGE D'UN ALLIAGE DE TITANE TI-6AL-4V

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ABSTRACT

Les alliages de titane sont utilisés dans l'aéronautique et l'industrie navale pour leurs bonnes propriétés intrinsèques, Ã savoir une faible densité (40% moins dense que l'acier), de très bonnes propriétés mécaniques et une très bonne tenue Ã la corrosion. L'étude a été réalisée pour proposer une modélisation de la rugosité de surface et l'optimisation des conditions de coupe lors de tournage d'un alliage de titane Ti-6Al-4V. Les essais sont réalisés avec lubrification suivant un plan de Taguchi L18 en variant quatre facteurs d'entrées Ã savoirÂ : la vitesse de coupe, l'avance par tours, la profondeur de passe et le matériau de l'outil (carbure métallique avec revÃªtement (PVD) (GC 1125) et un autre carbure sans revÃªtement (H13A). L'analyse de variance (ANOVA) a été utilisé afin de déterminer la contribution de chaque facteur et de déterminer le paramètre ayant une influence significative sur la rugosité de surface et le volume de coupeau enlevé. Le traitement des résultats a permis de proposer des modèles mathématiques permettant la prédiction de Ra et MRR. De plus, l'analyse de Taguchi basée sur le signal/bruit (S/N) a été utilisée pour minimiser la rugosité de surface et maximiser la productivité avec l'optimisation les conditions de coupe.

Keywords: *Modélisation, tournage, rugosité, Alliage de Titane, Optimisation.*

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SYNTHESE ET CARACTERIRATION THERMIQUE ET STRUCTURALE DES VERRES OXYFLUORES DOPES GADOLINIUM

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ABSTRACT

Les cristaux fluorés et les verres fluorés ont été largement étudiés au cours de la dernière fois dans le domaine de l'amplification optique principalement. Ils servent de matrices hÃ´tes pour les ions de terres rares, optiquement actifs. Ils sont visés pour leur transparence, leurs basses énergies de phonons ainsi que pour leur grande solubilité vis-Ã -vis des ions de terres rares. Nous présentons une étude thermique et structurale concernant les verres de fluorogermanates de plomb (système GeO2 - PbO - PbF2) dopés par des ions gadolinium (Gd3 +) (1-2). On a commencé par un traitement thermique après un traitement par des vitrocéramiques fluorescentes transparentes. Ces vitrocéramiques contiennent des nanocristaux de PbF2 dans lesquels sont insérés les ions Gd3 +.Sur les mélanges de départ de GeO2, PbO, PbF2 et GdF3avec les proportions 50% GeO2â€“ 40% PbO -10% PbF2et xGdF3 tel que x est la concentration de dopant. Ce mélange Ã 1050 EST chauffé Â° C Cet étape PÃ«rmet obtient des phases de généralement Verrès. Une phase que les phases d'oxydation ont été effectuées sur les phases de verres synthétisés avec un analyseur symétrique de type TAG 24, SETRAM, pour afficher le processus de nucléation afin de faire la dévitrification. Nous avons nos échantillons avec un diffractomètre Siemens D5000 utilisant une anode de Cobalt (Î» = 1.789 A Â°).

Keywords: *étude structurale., étude thermique, terres rares, vitrocéramiques, verres oxyfluorés*

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PHASE EVOLUTION OF AN AISI 316TI AUSTENITIC STAINLESS STEEL UNDER BULK COLD DEFORMATION

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ABSTRACT

The AISI 316Ti stainless steel has an adequate combination of mechanical resistance, formability and resistance to corrosion. It is commonly used for the production of construction parts and machines, especially in chemical, petrochemical and pharmaÂ-ceutics industry, and also for the production of tanks for the transport of aggressive substances. Titanium is added to suppress grain boundary Cr carbide precipitation, and to reduce susceptibility to intergranular corrosion, through the formation of very stable titanium carbide. In this paper the microstructural properties of the AISI 316Ti steels in the rolled condition (20%, 37% and 88 cold work) were characterized by various techniques, optical microscopy, scanning electronic microscopy, X-Ray Diffraction analyzer (XRD). In order to characterize the mechanical properties of 316Ti, nanoindentation tests were conducted. The elastic module and hardness are two most important parameters used for assessing the mechanical properties of materials. Microstructural analysis showed that cold deformation causes significant microstructural modifications in the steel, mainly hardening. This modification increases the mechanical resistance of the materials appropriately for their foreseen application. The formation and the amount of strain-induced martensite phase depends on the austenite stability (chemical composition and initial austenite grain size). When the rate of deformation is high, the martensite content will be higher. Â

Keywords: *Microstructure, Nanoindentation tests, Mechanical properties, steels*

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STUDY OF THE MATERIAL ND1.98SR0.02NI0.99CO0.01O4 Â± Î´ AS CATHODE FOR THE OXYGEN REDUCTION REACTION.

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ABSTRACT

Zinc-air cells are electrochemical systems whose oxygen reduction reaction is at the cathode. They are currently used to power hearing systems or electric fences. The life of these systems depends mainly on the cathode materials. Current research is focused on mixed conductive oxide materials in order to minimize the cost of production of noble metals and to improve its electrochemical performance. In this work we were interested in the development of the mixed conductor materials of neodymium nickelates (Nd1.98Sr0.02Ni0.99Co0.01O4 Â± Î´) by the citrate method. The electrocatalysts (Nd1.98Sr0.02Ni0.99Co0.01O4 Â± Î´ / C) consisting of the nickelates oxides and carbon black (Vulcan XC-72) were mixed and spread out into a thin layer on a glassy carbon substrate. The structural, morphological, and electrochemical properties of these cathode materials were studied and characterized by XRD, SEM, and linear voltammetry. The results obtained clearly show the activation of ORR on these materials.

Keywords: *Zinc, air battery, ORR, nickelates, XRD, SEM, linear voltammetry.*

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SYNTHESIS AND EMULSIFYING PROPERTIES ASSESSMENT OF NEW HYDROPHOBICALLY MODIFIED DERIVATIVES OF XANTHAN GUM

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ABSTRACT

The present study aims to synthetize amphiphilic derivatives of the bacterial polysaccharide, xanthan gum (Xan). The introduction of hydrophobic moieties onto the polysaccharide chains by means of Williamson etherification reaction was done in aqueous medium with two different ratios (R, reagent/polymer = 2 and 3). The obtained Xanthan gum derivatives (Xan2 and Xan3) were subjected to various physicochemical analyzes such as FTIR identification, melting point determination and viscosimetric study. The amphiphilic properties were also implemented by the determination of the Critical Aggregation Concentration (CAC) using conductimetric and turbidimetric measurements. At the end, an emulsifying test was also performed by formulating free surfactant emulsions stabilized with xanthan derivatives to confirm the amphiphilic potential of the xanthan derivatives by their ability to stabilize emulsions. The results of the FTIR analysis confirmed the modification by the detection of characteristic peaks corresponding to the C-H bond of the methyl groups CH2 and CH3 as well as the elongation of the peak attributed to the ether function. In addition, the melting point values which remained in the same order of magnitude with that of the native xanthan indicate that original structure of the molecule was not denatured by the modification. Moreover, the amphiphilic character was approved for the derivatives obtained by the detection of CAC, which decreases with the increased degree of modification. Finally, the formulation of emulsions based on native Xan and its derivatives has shown that both Xan2 and Xan3 have better emulsifying potential than the native gum due to their amphiphilic proprieties.

Keywords: *viscosity, hydrophobic modification, amphiphilic properties, xanthan gum, emulsion.*

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MODILISATION DE L'EFFORT DE COUPE ET DE LA PUISSANCE CONSOMMEE LORS DU TOURNAGE DE L'ACIER AISI D3 EN UTILISANT LES METHODES RSM ET ANN

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ABSTRACT

Le but des industriels aujourd'hui est d'abaisser au maximum les coÃ»ts des opérations d'usinage et particulièrement la puissance consommé durant l'usinage. De ce fait, la modélisation et l'optimisation des conditions opératoires doit contribuer largement au développement et Ã la productivité. Dans ce travail, deux méthodes de modélisation ont été utilisées et comparées afin de modéliser l'effort de coupe tangentiel (Fz) et la puissance consommée durant l'usinage (Pc). Les modèles sont déterminés en appliquant la Méthodologie de surface de réponse (RSM) et les réseaux de neurones (ANN). Le plan d'expérience adopté dans ce travail est celui de Taguchi L16 (4^3 2^1) pour mettre en évidence la relation entre les paramètres de coupe Ã savoir (le rayon de bec, la vitesse de coupe, l'avance par tour et la profondeur de passe) et les réponses étudiées (Fz et Pc). Les essais d'usinage sont réalisés en tournage sur un acier Ã outils pour travail Ã froid AISI D3 en utilisant un outil de coupe en carbure Ã triple revÃªtement CVD (Al2O3+TiC+TiCN). Les résultats trouvés montrent que l'application de la technique des ANN sur un nombre limité d'expériences est capable de prédire la réponse avec une précision supérieure Ã la méthode RSM.

Keywords: *RSM, carbure revÃªtu en CVD, effort de coups, tournage, AISI D3, ANN*

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THE INFLUENCE OF NAOH CONCENTRATION ON THE MECHANICAL PROPERTIES OF IRON SLAG-BASED GEOPOLYMER PASTE

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ABSTRACT

It is well known that the chemical composition of iron slag is more variable than that of granulated blast furnace slag. It is pointed throughout this study that the use of low calcium slag as a precursor and alkaline activator at the geopolymerization process will be an appropriate material to develop a new high-performance eco-friendly product with low energy consumption and CO2 emissions. The alkaline solutions used in the present study were sodium silicate (Na2SiO3) and sodium hydroxide (NaOH), where the molarity of sodium hydroxide (NaOH) was varied from (6 to 14M). To prepare geopolymer mixes, the binder-to-liquid ratio was kept at 2.7, while the sodium silicate-to-sodium hydroxide ratio was 2, the mixes were cured at a temperature of 65Â°C. To investigate the influence of (NaOH) concentration on the mechanical properties at different ages, a compression test was performed at 1, 7 and 28 days. The Results showed that at early ages, the compressive strength increased with the increase of NaOH concentration. The compressive strength results which corresponding to 14M of NaOH were 38.20 MPa and 71.3 MPa at 1 and 28 days, respectively. However, the large compressive strength of 77.5 MPa has been obtained at 28 days with good workability was for those mixes within a concentration of 6M, which was considered as an optimum concentration in this study.

Keywords: *iron slag., geopolymer, strength, concentration, sodium hydroxide*

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HETEROGENIOUS RING OPENING COPOLYMERIZATION OF Æ□-CAPROLACTONE WITH STYRENE OXIDE USING A PROTON EXCHANGED MONTMORILLONITE CLAY

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ABSTRACT

The Aliphatic polyesters are attracting increasing attention due to their excellent biocompatibility, biodegradability, and also for their use in the biomedical field as speciality polymer1-4. Indeed polycaprolactone (PCL) is an important biodegradable polyester due to its mechanical properties and miscibility with a large range of other polymers5. In order to extend applications of PCL, many studies have described the copolymerization of (CL) with other monomers. These materials are synthesized using expensive catalysts, containing heavy metals, that presents environmental disposal problems for the user. On the other hand, Montmorillonite, a class of inexpensive and noncorrosive solid acids, have been used as efficient catalysts for a variety of organic reactions. The reactions catalyzed by montmorillonite are usually carried out under mild conditions with high yields and high selectivities. This heterogeneous catalyst is easily recovered and reused. In this report, we describe the copolymerization of (CL) with styrene oxide (SO), catalyzed by an Algerian proton exchanged montmorillonite clay (Mag-H+). The effects of the amounts of the Mag-H+ and the temperature on the synthesis of poly (CL-co-SO) are also discussed.

Keywords: *Ring opening copolymerization., H+, Maghnite, Styrene Oxide, caprolactone, Æ •*

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FATIGUE-LIFE PRDICTION OF COMPOSITE LAMINATE UNDER FLEXURAL LOADING

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ABSTRACT

This investigation concern the development of two prediction fatigue life models of cross-ply laminates, made up of glass fibre and epoxy resin, loaded under flexural control load. Both models are based on the description of the load's evolution versus the cycle number (n) during fatigue tests by several empirical functions f(n) of logarithmic, exponential, power and linear types. The coefficients of these f(n) depend on materials and loading conditions. Therefore, the use of such approach permits the prediction of composite fatigue life that can be made without the systematic fatigue tests which are not only costly but also time consuming, or at least reducing their number considerably. Both models allow, by a simple analytical approach, direct interpretations of physical phenomena which may intervene during tests. Furthermore, the analytical results obtained are in good agreement with the experimental ones.

Keywords: *flexural, composite laminate, fatigue life prediction, load control*

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SYNTHESIS AND MORPHOLOGY OF THERMOSENSITIVE HYDROGELS PNIPAM / ALGINATE / MAA AND THE EFFECT OF CROSSLINKING RATIO ON THEIR SWELLING BEHAVIOR.

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ABSTRACT

Stimulus-reactive polymers and their assemblies, such as co-polymerized hydrogels, can be dissociated or become relatively permeable upon excitation with an environmental stimulus such as temperature, pH, solvent composition [1].The thermosensitive hydrogels can be used in different fields of science such as medicine, biotechnology, water treatment, cosmetics ... etc.In this study, sodium alginate and poly (N-isopropylacrylamide) were used to prepare interpenetrating polymer network (IPN) hydrogels sensitive to temperature and pH. In this work we have studied the influence of the degree of crosslinking on the behavior of our swelling hydrogels and on their structure and their morphology. These thermosensitive hydrogels were synthesized through a radical polymerization using an initiator and a crosslinking agent. Subsequently we have varied the weight of the crosslinking agent relative to the total weight of the comonomer. These hydrogels were characterized by infrared spectroscopy (FTIR), scanning electron microscopy and by a study of their swelling behavior.

Keywords: *PNIPAM, Alginate, thermoresponsive hydrogels, Maleic acid*

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STUDY OF THE MECHANICAL STRENGTH OF A COMPOSITE CARBON/PERLON/EPOXY USED IN THE MANUFACTURE OF ORTHOPEDIC PROSTHESIS.

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ABSTRACT

The aging of the population and the frequent accidents at work and on the road offer composites manufacturers a high growth potential. As in many other sectors of activity, it is primarily for their lightness and strength that composites are in great demand in health. Prostheses of all types, bone implants, screws and rods to reconcile a rupture, or as instruments. Composites, which generally consist of mixtures of fibers and polymeric resins, are the ideal solution to the various problems and needs expressed by surgeons and physicians. The composite materials exhibit interesting new properties and can easily substitute metals and plastics. The latter consist mainly of consolidated acrylic resin reinforced with glass fibers, carbon fibers, or natural fibers. They are the most requested materials in the manufacturing industry of prosthetic devices for orthopedic use for people with disabilities. They are suitable for all complex shape requirements thanks to their manufacturing method which requires the use of successive layers in order to form subsequently laminates free of any imperfection and exhibiting no defects. In the present work the mechanical and morphological properties of two types of composite materials are compared. Indeed, the mechanical strength of the carbon fiber / epoxy resin composite is significantly greater than that of the material made of carbon fibers/perlon/epoxy resin. To complete the tensile test results, extensive SEM observations revealed that the carbon fibers/perlon/epoxy resin composite exhibits the same damage as the carbon fiber/epoxy resin composite, but in a more marked manner. This is due to the nature of the material that has more anisotropic than the previous one. The decohesion is more marked between the carbon plies and perlon, which contributes to more interlaminar delamination and more fragility for the material.

Keywords: *anisotropy, rupture, mechanical properties, prosthesis, composites, delamination*

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3-ACETOACETYLCOUMARINE : EVALUATION OF THE ANTIRADICALAR ACTIVITY AND DRUG-LIKENESS PREDICTION

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ABSTRACT

The antioxidant potential of 3-acetoacetylcoumarine derivatives were determined on the basis of their scavenging activity of the stable 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical. From the results , it was found that the compounds displayed strong antioxidant activity as ascorbic acid . Â The theoretical investigation of the physico-chemical properties of 3-acetoacétyl-coumarine derivatives, the octanolâ€“water partition coefficient (logp) , number of H-bond acceptors HBA and number of H-bond donors ,are in the acceptable ranges. However, analysis of the drug likeness results shows that all synthesized acetoacetylcoumarin derivatives pass all used rules. The ADMET properties become an important aspect of drug discovery process. On this purpose, admetSAR Â and SwissADME servers were used to predict AMES toxicity.

Keywords: *antioxidant activity, ADME, ADMET.*

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PHYSICO-CHEMICAL AND THERMAL CHARACTERIZATION OF DATE PALM FIBERS IN ORDER TO BE USED AS REINFORCMENT FOR BIO-COMPOSITE MATERIALS

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ABSTRACT

Composite materials are generally used for their low density and high mechanical properties, these advantages make them particularly interesting for various applications. Moreover, about 99% of the composites mass-produced currently manufactured are reinforced with glass fibres, however, nowadays, when environmental standards are becoming more and more severe, glass/thermo-plastic polymer composites disadvantages related to the protection of the environment. Indeed, these findings have favored the emergence of a promising alternative to develop biodegradable bio-composite or recyclable materials from renewable natural resources. Currently, natural fibres issue from plants like flax, hemp, palm, sisal, ... etc., seem to be the best candidates. Â As part of the valorisation of local biomaterials, the development of biodegradable composites reinforced with natural Date Palm Surface Fibres (DPSF) was considered in this research. This study also aims to highlight the effect of alkaline treatments using different NaOH concentration and immersion time on the physic-chemical properties using different techniques such as FTIR, DSC and TGA. The morphology of the surface was investigated by an optical microscope. The results obtained were compared with those obtained in the literature.

Keywords: *chemical characterization., physico, structural morphology, thermal insulation, date palms fibres*

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3D XFEM SIMULATION OF THE IMPACT OF CRACK SIZE AND CRACK ORIENTATION VARIATION IN CARBON FIBER COMPOSITE

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ABSTRACT

The development of composite materials characterized by the constant amelioration of their mechanical properties (stiffness and strength) has widened their application for structural elements, mainly in aeronautical, naval and automobile industries. The use of composite materials is advantageous due to the cost saving and weight reduction. Mechanical tests for such materials are useful for determining their characteristic and limits; however, it is not possible to perform mechanical tests for each structure. Therefore, numerical analyses have wide applications [1, 2]. In this work, numerical simulation of cracked Carbon-Epoxy composite specimens has been conducted using the commercial software ABAQUS. These specimens are subjected to tensile test conditions with a constant concentrated load of 5000N witch provide useful information on the behavior of those cracked specimens. However, the specimens represent a cracked area with different length (Crack size) (2.5mm; 3mm: 3.5mm; 4mm and 4.5mm) and with different crack angles (0Â°; 10Â°; 20Â°and 50Â°) for a fixed crack size (4mm). The simulation results show the influence of crack size and crack angle on the resultant stresses and specimens displacement. Where it appears that the stress decay when the crack angle increase toward the fibers direction (90Â°). The influence of the crack propagation on the other hand is well remarkable in the results of the stress strain curves plotted near the cracked elements of the specimens and near the non-cracked one. A dramatic drop in stress is also noticed for the already cracked zone. The XFEM crack simulation method allows to better represent the crack propagation and specimens failure and allows extracting more detailed information on cracked composite materials.

Keywords: *Crack propagation, Crack, XFEM, Carbon fiber*

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TEMPERATURE EFFECT OF ELASTIC INTERACTION BETWEEN DISLOCATIONS AND GRAIN BOUNDARY

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ABSTRACT

A large number of mechanical properties of the elastic and plastic materials are determined by the interaction between the defects present in the crystal, in particular the interactions between the dislocations and the joints. When the dislocations in elastic interaction with grain boundary are subjected to a force called the image force, this force is derived from the elastic interaction energy dislocation - grain boundary and calculated in the framework of the anisotropic linear elasticity according to Model of Barnett and Loth, byStroh formalism. The sign and intensity of this energy predicts the behavior of a dislocation near a grain boundary. When H and As are negative DE decrease, the elastic interaction energy is negative, so the image force is attractive. When the temperature increases H decreases however the elastic interaction energy of a single-phase polycrystalline hexagonal structure (Ti, Zr and Zn), we study the effect of temperature on the image force of elastic interaction of a burgers vector dislocation b = 1/3 [11-20] and a disorientation grain (60 Â°) around the axis [10-10]. The results show that the intensity and the sign of the elastic interaction energy depends on anisotropy factor H and the shear anisotropy ratio As, when H and As are positive, the elastic interaction energy is Positive, so image strength is repulsive. H and As increases with temperature and similarly the elastic interaction energy In Ti, Zr and Zn, the image force efficiency distance increases with the absolute value of H and with the temperature it is of the order of 10 nm at 25 Â° C and becomes 25nm at 300 Â° C. The image force increase with temperature when dislocation located in materials having a positive anisotropy factor and it decreases with increasing temperature when located in negative factor.

Keywords: *hexagonal structure, Peierls stress, Force image, Dislocation, Grain boundary, anisotropic elasticity.*

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L'EFFET DE L'ETUVAGE PAR ENERGIE SOLAIRE SUR LA RESISTANCE MECANIQUE DES BETONS, L'ENVIRONNEMENT ET LEUR DURABILITE

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ABSTRACT

L'étude se base sur l'influence de durcissement Ã la vapeur par énergie solaire sur la résistance mécanique des bétons pour les éléments préfabriqués. Un programme expérimental a été réalisé pour étudier en parallèle l'effet du rapport eau/ciment (0.4, 0.5 et 0.6), l'influence de ciment type et l'influence des méthodes d'étuvage (le durcissement Ã l'eau, Ã l'air et le durcissement par étuvage Ã 30Â°C et Ã 45Â°C). Six formulations de maniabilité similaire Ã base de deux types de ciment (CEMI 42.5) et (CEM II/B 42.5), trois de chaque type sont étudiés. Les résultats nous permettent de mettre en évidence l'effet bénéfique de la procédure de durcissement pour obtenir une maximale résistance mécanique, surtout Ã jeune Ã¢ge. La technique de durcissement par énergie solaire est une technique efficace pour accélérer le durcissement des bétons et mortiers, pour une grande économie d'énergie électrique au sud algérien. GrÃ¢ce aux résultats obtenus un gain de temps et plus courts délais de fabrication pour atteindre la résistance Ã la compression Ã 28 jours Ã l'air libre après un durcissement Ã la vapeur d'un jour et trois jours de prolongement de durcissement Ã l'air libre pour les deux types de ciment et les différents du rapport eau/ciment.

Keywords: *résistance mécanique, béton préfabriqué, étuvage, énergie solaire, durabilité.*

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BINARY ADSORPTION OF ANIONIC DYES BY MODIFIED DOLOMITE FROM SYNTHETIC SOLUTION : EQUILIBRIUM AND THERMODYNAMIC STUDIES

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ABSTRACT

Removal of anionic azo dyes, reactive black 5 (RB5) and Congo red (CR) by dolomite heated at 900 Â°C (D900) was investigated in binary solutions from synthetic solutions. Physical characteristics of D900 were studied using scanning electron microscopy (SEM) and Lazer granulometry. The effects of initial concentration, contact time, and temperature were assessed. A competitive adsorption between the two azo dyes was observed and it was noticed that CR was favored. At equilibrium, CR is more strongly coadsorbed than RB5, viz. 229.18 against 72.37 mg g-1 at 40 Â°C, respectively. Chemical interaction would be explained through the implication of amine function of RB5 and CR at the D900 surface. The fact that CR contains two amine functions would explain why it is more adsorbed than RB5. Experimental isotherms were presented in the 3D surface plot and were interpreted using extended Langmuir model. The latter gives a good approach of the experimental points. Thermodynamic study in binary system shows that when RB5 competes with CR for filling of adsorption sites, the endothermic character decreases whilst non-spontaneity becomes increasingly marked. Numerous industrial effluents are composed of a mixture of dyes, so that dolomite treated at 900 Â°C constitutes a promising adsorbent to remedy the multicomponent systems. Dolomite treated at 900 Â°C constitutes a promising adsorbent to remedy the mixture of dyes solution.

Keywords: *binary system, Congo red, RB5, Keywords: Dolomite, Equilibrium, thermodynamic*

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COMPLIANCE WITH RPA OF AN OLD BUILDING

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ABSTRACT

Most of the old buildings in Algeria were built before the appearance of the Algerian seismic regulation. They were designed to resist the vertical loads without considering the impact of the earthquake. In this case, compliance with the RPA against the earthquake is necessary to ensure the safety of these constructions. The solution adopted in the present research is the reinforcement by insertion of reinforced concrete bracing sails in both directions of the structure. The objective of this article is the study of the influence of reinforcement on the strength of the resistance of the structure and the methodology of compliance with RPA 99 version 2003 of a building built before the appearance of the first Algerian seismic code RPA 81. The results obtained after reinforcement, from a Pushover analysis in terms of ductility demand ÂµD, the elastic stiffness of the structure Ke , The stiffness performance point Kp and the global degradation indicator Id show an increase in capacity in terms of displacement and shear force.

Keywords: *compliance, Pushover analysis, reinforced concrete building, Rehabilitation, Algerian seismic regulation.*

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EFFECT OF DEFERENT ANODIZING BATH ON IMPROVING THE CORROSION RESISTANCE OF A 2024 ALUMINUM ALLOY

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ABSTRACT

Aluminum alloys have a considerable appeal for mechanical and building designers. This characteristic lies in the mechanical and physicochemical properties of these alloys. Aluminum is often used in the anodized surface condition to impart pleasing aesthetics, higher corrosion resistance, better scratch and wear resistance, and thus an improved value of the product. Anodization is commonly produced by direct current (DC) that offers excellent protection against wear and corrosion. This work focuses on the surface condition of a 2024 aluminum alloy treated with chromium and sulfuric acid. Our goal is to understand what happens at the surface of the Al alloy after each treatment (chromic anodizing, sulfo-chromic anodizing) using a structural characterization (DRX, MEB, AFM and ATR) that will be followed by electrochemical characterization. The results obtained have shown the effectiveness of chromic anodizing, which gives rise to the formation of a thin layer and offers excellent protection against corrosion. Chromic anodic oxidation protects an aluminum part by creating a layer of alumina Al2O3, to give it anti-corrosion, decorative and heat resistance characteristics, as well as any chromic acid residues do not attack the base material. This in opposite to sulfuric acid, which makes it an excellent pretreatment for aerospace parts.

Keywords: *cyclic polarization., electrochemical impedance, sulfochromic anodizing, chromic anodizing, Corrosion*

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ELABORATION ET MISE EN ŒUVRE DE MATERIAUX MOLECULAIRES POREUX DU TYPE ZEOLITIC IMIDAZOLATE FRAMEWORKS ET APPLICATION A L'ADSORPTION DE VERT DE BROMOCRESOL

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ABSTRACT

Les matériaux poreux possèdent un très grand intérÃªt économique pour l'industrie. Ils sont couramment utilisés pour la purification ainsi que pour la séparationÂ des composés dans les solutions aqueuses ainsi que les gaz et les hydrocarbures. La rentabilité d'un procédé de séparation basée sur l'adsorption est trèsÂ dépendante de l'adsorbant qui est utilisé. C'est pour cela que de nombreuses recherches sontmenées dans le but d'optimiser les performances des adsorbants actuels ou pour les remplacerÂ par des matériaux plus performants. Les matériaux moléculaires poreux de typeÂ Zeolitic Imidazolate FrameworksÂ (ZIFs), une sous-classe des structures organométalliques (MOFs), constituent un nouveau type de matériau poreux cristallin qui combine des propriétés hautement éligibles Ã la fois pour les zéolithes et les MOFs, comme laÂ microporosité, la surface spécifique élevée,Â la grande stabilité thermique, mécanique et chimique permettant de nombreuses applications telles que l'adsorption et la séparation de gaz. Dans cet article, nous cherchons Ã évaluer lesÂ ZIFsÂ comme nouveaux adsorbants pour l'adsorption de vert de bromocresol dans une solution aqueuse.Â Dans un premier temps, pour déterminer les propriétés physico chimiques de ZIFs élaborés on a utilisé les différentes techniques telles que La spectroscopie infra rouge, l'analyse thermogravimétrique (ATG), la diffraction des rayons X (DRX) et le microscope électronique Ã balayage (MEB) pour voir la morphologie de ZIFs préparés. Dans un deuxième temps,Â on a étudié l'influence des différents paramètres influant directement sur la capacité d'adsorption maximale de vert de bromocresol par les ZIFs élaborés dont l'influence du temps de contact, l'influence du pH du milieu,Â l'influence de la vitesse d'agitation et l'influence de la dose de l'adsorbant. L'étude paramétrique nous permettra de déterminer les conditions optimums qui seront fixées pour tracer les isothermes d'adsorption caractéristique des ions étudiés.

Keywords: *adsorption, ZIFs, matériaux poreux, chaleur d'adsorption, isothermes.*

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THERMAL STABILITY OF CELLULOSE MICROCRYSTALLINE EXTRACTED FROM DATE PALMS USING ECOFRIENDLY ISOLATION

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ABSTRACT

Recently, several research works have been conducted over the world to replace the synthetic materials by natural and renewable bio-sources in the production of liquid and solid fuels, biocomposites materials and other high-value products owing to their toughness, lightweight, abundance, cheapness, renewable and biodegradable properties. Cellulose microcrystalline (MCC) is a naturally occurring substance obtained from purified and partially depolymerized cellulose. Acid hydrolysis is the conventional method of choice for manufacturing MCC. In the two last decades, MCC has shown potential in several new applications such as nanocomposites, pharmaceutical application, in food industry as stabilizer, emulsifier, thickener and gelling agents in several dairy compounds and energetic materials because of its renewability, non-toxicity, economic value, biodegradability, high mechanical properties, high surface area and biocompatibility. In this work, MCC particles have been isolated from date Palms cellulose using acid hydrolysis method. The obtained product has been fully characterized through infrared spectroscopy (FTIR), scanning electron microscopy (SEM), X-ray diffraction (XRD), and differential scanning calorimeter (DSC). The obtained results showed that the extracted cellulose microcrystalline exhibited similar properties with respect to the commercial one. FTIR demonstrated that most hemicellulose and lignin of the raw fibers were removed during the extraction process. XRD spectra of cellulose revealed that acid hydrolysis of (date palms-C) increased the crystallinity, due to degradation of the amorphous components. The MCC sample prepared presented higher thermal stability properties, thus making it a promising candidate for use in many fields such as reinforced-polymer composites, pharmaceuticals, and food industry.

Keywords: *sources, cellulose microcrystalline, date palms, bio, cellulose, reinforced, polymer*

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STUDY OF THE MACHINABILITY OF ALEPPO PINE WOOD (PINUS HALEPENSIS MILD) AND EUCALYPTUS CAMALDULENSIS DEHN ALGERIANS

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ABSTRACT

The objective is the study of the machinability of Algerian woods under the effect of collapse for use in industry and construction. Optimal cutting conditions and machinability of two species of hardwood and softwood are being considered: Leafy species: Eucalyptus Camaldulensis Dehn; wood species subject to the phenomenon of collapse. It is a failure of drying wood that results in a collapse of the structure and surface undulations. Resinous species: the Aleppo pine (Pinus halepensis Mild); more stable species of wood dimensionally. These two species are of economic importance for the case of Algeria. The machining of the wood is done by removing chips with sharp cutting tools at high speed to obtain a good surface. The surface condition of the wood material comes from the fact that it is related to many parameters whose studies aim to control the machinability and consequently the quality of the finished product. Thus, regardless of the machining mode, the ultimate goal is to obtain a competitive product whose quality of execution will be characterized by a geometric precision directly related to the notion of roughness. The present study allowed us to determine eight machining conditions, depending on the desired surface quality ; and based on the following quality criteria: The surface condition of Eucalyptus Camaldulensis Dehn is better for the cutting conditions IV and VIII (low roughness), than that presented by the Aleppo pine. On the other hand, the Aleppo pine has a better surface condition than Eucalyptus Camaldulensis Dehn for the following cutting conditions: I, II, III, V, VI and VII. These results can be used in the wood industry to optimize the cutting conditions of both wood species and to rationalize production. This study also provided insight into the possibility of substitution of imported wood species.

Keywords: *Eucalyptus Camaldulensis Dehn., Aleppo pine, Keywordsâ€"Machinability*

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MEASUREMENT OF ACOUSTIC TRANSMISSION WAVE IN FLOOR OF BUILDING WITH RESILIENT MATERIAL

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ABSTRACT

In a multi-storey building, the occupants are exposed to noises through walls and floors because the rooms shares those walls and floors with neighboring upper and lower apartments. The present paper examines the measurement of impact noise transmission wave through floor layers of apartment F5 in multi storey buildings located in Algiers. The interior walls and ceiling are designed with concrete and a thin layer of plaster. The rooms are furnished with carpet, curtain, bed and chairs. The equipments used are: sound level meter analyzer BrÃ¼el and KjÃ¦r 2270 with BZ 5503 software, and impact tapping machine BrÃ¼el and KjÃ¦r 3204. The floor is composed of: tile of 2 cm, resilient material of 1 cm, mortar layer of 2 cm and reinforced concrete slab of 15 cm of thickness. This type of floor is the most used in Algerian construction. The noise has been generated using tapping machine placed on the floor of the second storey apartment, the sound level meter has been placed in the apartment located below. The results show that the level of impact noise measured in the room above (first storey) is LnT = 68 dB. The regulatory value of the impact noise level is LnT =58 dB. In conclusion, this floor requires an improvement of acoustic insulation. Resilient layer of acoustic reduction (Î”L=10 dB) is sufficient to ensure the acoustic comfort in the first storey apartment. Acoustic level mapping has been obtained in the above apartment during the operation of taping machine. In addition, it is recommended to use resilient materials that can reduce the noise in the frequencies range of [1000 Hz-4000 Hz]. The results obtained can be used as a tool to improve the acoustic performance of floor in residential buildings particularly during the execution of the national program of housing.

Keywords: *floor, impact noise, Acoustic wave, building*

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ETUDE D'USINABILITE LORS DU TOURNAGE DUR D'ACIER AISI 4140 AVEC DES OUTILS EN CERAMIQUE EN UTILISANT LA METHODOLOGIE DE LA SURFACE DE REPONSE

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ABSTRACT

Les outils statistiques, ainsi que les outils mathématiques, ont été largement adoptés et leurs performances ont été démontrées dans différents problèmes d'ingénierie oÃ¹ la randomisée existe généralement. Dans le domaine de l'ingénierie, la fusion de l'analyse statistique en une évaluation structurelle sera une tendance Ã l'avenir. En combinant des techniques mathématiques et statistiques, la méthodologie de surface de réponse a été appliquée avec succès Ã l'optimisation de la conception, Ã la prédiction de la réponse et Ã la validation du modèle. Le but de cette étude était d'évaluer l'impact de facteurs tels que la vitesse de coupe, la vitesse d'avance et la profondeur de coupe sur l'effort de coupe (Fr) et la rugosité de surface (Ra) de deux outils de coupe en céramique mixte (CC650 et CC6050) au cours du processus de tournage dur de l'acier AISI 4140. Les résultats expérimentaux indiquent que les modèles mathématiques proposés suggérés pourraient décrire adéquatement les indicateurs de performance dans les limites des facteurs étudiés. La profondeur de coupe est le facteur le plus important qui influence les composantes de la force de coupe et la variation de la vitesse l'avance influe directement sur l'état de la rugosité de surface. Cependant, il existe d'autres facteurs qui apportent une contribution secondaire aux indicateurs de performance.

Keywords: *RSM, Céramique â€“ ANOVA, AISI 4140 steel, Tournage dur, Usinabilité*

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FONCTIONNALISATION ELECTROCHIMIQUE DE L'OXYDE D'INDIUM DOPE A L'ETAIN (IN2O3 : SN) PAR REDUCTION DE 4-NITROBENZENE DIAZONIUM

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ABSTRACT

Les applications optoélectroniques reposent souvent sur l'utilisation de l'oxyde d'indium-étain (ITO) comme matériau d'électrode transparent. Avant utilisation, ce substrat nécessite une amélioration de ses propriétés, notamment de transfert de charges inter-faciales. Pour cette raison, ils doivent subir une ou plusieurs modifications, devant Ãªtre robustes et contrÃ´lées et plus particulièrement, celle consistant a y accroché une molécule de faÃ§on covalente, souvent réalisé par électro-greffage d'un sel diazonium et dont nous nous somme intéressé. La diminution du courant lors de la chronoampérométrie, sur une électrode en ITO plongée dans un milieu aprotique contenant du 4-Nitrobenzènediazonium, indique l'électro-greffage de celui-ci aboutissant Ã la fonctionnalisation de l'ITO. Par rapport au substrat nu, le signal redox réversible du ferrocène est fortement perturbé. En effet, une diminution du courant des pics redox et une augmentation de leur écart de potentiel (Î”E), ont été observé lors de la voltammétrie cyclique. Ces observations confirment qu'une couche organique est attachée Ã la surface du substrat et agit comme une barrière pour les processus redox. De plus, cette couche fait augmenter la résistance de polarisation et fait diminue la capacité, dont les résultats ont été obtenus par spectroscopie d'impédance électrochimique. Ceci indique que la structure du film déposé est assez compacte, ce qui limite la perméabilité du couple redox pour atteindre le substrat (ITO) et y échangé les électrons. De plus, les spectres ATR-IR confirment la présence des groupements fonctionnels (-NO2,) sur la surface d'ITO fonctionnalisée.

Keywords: *chronoampérométrie, voltammétrie cyclique, Nirobenzene diazonium, 4, ITO, Elecélectrogréffage, foncionnalisation de surface*

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CORROSION AND TRIBOLOGICAL BEHAVIOR OF NI -BASE THERMAL SPRAY COATING DEPOSITED ON Z200C12 STEEL.

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ABSTRACT

In this work, Ni-base powder named Proxon 21021 (P21) was sprayed on Z200C12 steel using a thermal flame spray technique. The microstructure, phase compositions, and chemical element distribution of the coating were characterized using X-ray diffraction (XRD), scanning electron microscope (SEM), energy dispersive spectrometer (EDS)), and X-ray mapping techniques, respectively. The corrosion and wear behavior of the coating after spraying were studied. The electrochemical corrosion of the Ni-base coating in comparison with substrate was investigated in 3.5% NaCl solution, using electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization techniques. Wear tests were carried out in a tribometer type TRIBO tester against Alâ,,Oâ,*ƒ* ball under dry conditions with a loading of 4, 6, and 8N. The EIS and polarization results showed the beneficial effect of the coating on the corrosion performance of substrate. The average friction coefficient under low load 4N, gave value about of 0.491, whereas only 0.471 was recorded during the load of 8N. Wear rate values increase with the increased of applied load up to 8N.

Keywords: *corrosion, microstructure, Flame spraying, friction and wear behavior.*

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COMPORTEMENT TRIBOLOGIQUE D'UN DEPOT D'ALUMINEAL2O3 OBTENU PAR PROJECTION THERMIQUEA FLAMME-FIL

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ABSTRACT

La projection thermique consiste Ã propulser un matériau d'apport, totalement ou partiellement fondu par la chaleur, sur un substrat Ã revÃªtir. Parmi les matériaux d'apport utilisés, on trouve les céramiques, qui possèdent d'excellentes propriétés mécaniques telles qu'une grande dureté, une bonne résistance Ã l'usure et une grande inertie chimique. Cette polyvalence permet la sollicitation de ces matériaux dans des environnements extrÃªmes.Les dépÃ´ts en céramique durs sont des candidats très bons pour des applications anti-usure et anticorrosion. Ce travail porte sur la caractérisation microstructuraleet mécanique d'un dépÃ´t en céramique type (Al2O3) déposé sur un substrat type E335 par la technique de projection thermique Ã flamme-fil. Les microstructures du matériau d'apport et du dépÃ´t sont obtenues en utilisant le microscope électronique Ã balayage (MEB). Les essais tribologiques ont été réalisés avec un essai de frottement de configuration (pion-disque) Ã différentes charges avec deux vitesses de glissement (0,5 m/s et 1 m/s) en vue de déterminer la perte de masse. Les observations microstructurales ont montré que les dépÃ´ts Al2O3 présentent une morphologie lamellaire homogène, dense et compacte avec la présence de quelques porosités. Les résultats d'usure ont révélé que la vitesse de glissement et la pression de contact appliquée influent sur la variation de la perte de masse. Â

Keywords: *Microstructure, DépÃ´t, Projection thermique, Usure.*

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ETUDE METALLOGRAPHIQUE D'UN JOINT SOUDE D'AL 1050A SOUS L'EFFET THERMIQUE

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ABSTRACT

Ce travail a pour objectif d'étudier l'effet du traitement thermique sur les propriétés micrographiques et mécaniques d'un joint soudé par TIG d'aluminium 1050A. Pour la caractérisation des échantillons, nous avons utilisé différentes techniques expérimentales telles que le microscope optique, la DRX, la microdureté Vickers et l'EBSD. Cette étude nous a permis de suivre l'évolution de la microstructure cristallographique du joint soudé sur ces trois zonesÂ : MBÂ ; ZAT et ZF. Les analyses ont montré qu'un grossissement des grains et des nouvelles orientations dans les plans cristallographiques (hkl) sont observés on gardant la mÃªme composante et la mÃªme structure CFC. Les mesures de la microdureté ont montré une amélioration dans les propriétés mécaniques des zones du joint soudé essentiellement la zone affectée thermiquement et la zone fondu.

Keywords: *Microstructure, TIG, Aluminium 1050, Soudage, EBSD.*

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CYCLOHEXANONE OXIDATION OVER H3PMO12O40 HETEROPOLYACID VIA TWO ACTIVATION MODES. EFFECT OF SOLVENT NATURE

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ABSTRACT

Adipic acid (AA) is one of the important chemical monomers for the production of polyamides, polyesters and polyurethanes. In addition, it is widely used as an additive in cosmetics, gelatins, lubricants, fertilizers, adhesives, insecticides, paper and waxes. However, the industrial protocol suffers in addition to the corrosion, to the inevitable emission of N2O (300 Kg N2O / tonne AA), thus leading to global warming and the destruction of the ozone layer. Our approach fits into this context. Thus, the adipic acid synthesis was carried out in the presence of H3PMo12O40 heteropolyacid as clean catalyst and hydrogen peroxide as green oxidant from cyclohexanone oxidation under microwaves irradiation (30min at 100watt) and conventional method,under reflux, (20h at 90Â°C).The effects of catalyst mass, substrate amount and solvent nature (H2O, CH3CO2H, CH3OH, CHCl3 and CH3CN) on AA yield were examined. For both activation modes, microwaves irradiation and conventional method, the highest AA yields are of 26 and 28% in the absence of solvent, for catalyst mass of 0.03 g and cyclohexanone amount of 30 mmol with H2O2 at 30%.

Keywords: *Hydrogen peroxide., Cyclohexanone, Adipic acid, Heteropolyacid*

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IMPACT OF THE NATURE OF FIBERS ON THE PHYSICO-MECHANICAL BEHAVIOR AND DURABILITY OF CEMENT MATRICES

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ABSTRACT

The purpose of this work is to quantify the effect of the fibers on the mechanical behavior of concrete, regarding the resistance to compression and flexion. For this purpose, four mixtures were used, a concrete without fibers serving as control concrete identified under the name BT, and fiber reinforced concrete (BFM, BFP, BFPM). The experimental study was carried out on specimens of geometrical characteristics adapted to the tests carried out. The results of this experiment show that the addition of the fibers contributes to the improvement of the flexural tensile strength and the splitting tensile strength; The fibers slightly increase the compressive strength of the concrete. The results also show that adding fiber improves the durability of concrete.

Keywords: *fiber microstructure, adding, durability, concrete, Mortar*

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ETUDE COMPARATIVE DU TOILAGE PAR GALET DUR ET TENDRE D'ACIER DUR

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ABSTRACT

Pour l'obtention de surfaces fonctionnelles d'acier dur de haute précision, la technique de superfinition utilisant la bande abrasive est le procédé le plus utilisé dans l'industrie automobile. Dans ce processus, le contact élastique par galet est un élément clé ayant un impact direct sur la texture de surface toilée. Il doit posséder la fonction de transmission de la pression aux grains abrasifs. Donc, l'objectif principal de cet article est de comparer l'impact de galet dur et galet tendre sur la texture de surface. Pour cela, nous avons utilisé un galet dur en alliage métallique (galet en laiton G-LA) et un galet tendre en polymère (galet en polyamide G-PA 6). D'après les résultats, on que le galet G-PA 6 de dureté 60 Shore D montre une bonne reproductibilité, procurant une texture de surface meilleure comparée Ã celle obtenue avec l'autre galet dur G-LA. Dans cette étude de cas, la valeur de hauteur des pics éliminés Rpk est d'environ 0,05 Âµm, ce qui va limiter la période de rodage. En outre, cette configuration de toilage par galet dur est utilisée surtout pour l'opération d'ébauche.

Keywords: *usinage de précision, bande abrasive, toilage, galet dur, galet tendre.*

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EFFECTIVENESS OF THE PARTIAL CONFINEMENT OF THE CONCRETE CYLINDERS WITH COMPOSITES: NUMERICAL ANALYSIS

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ABSTRACT

In this work, we present the influence of the height of the partially confined part of the concrete cylinder by 'GFRP' composites on the strength and failure mode of cylinders under an axial compression loading by using a FE element analysis. Three configurations of cylindrical specimens were considered: 'CRef' control concrete cylinder, 'CC' totally confined cylinder and 'CPC' partially confined cylinders. Several heights of the confined part were considered defined by the parameter 'x / h' which represents the ratio of the height of the confined part to the total height of the cylinder. The results obtained by FE analysis show that the ultimate strength and the mode of rupture depend on the ratio 'x / h', in fact, the different cartographies of the stresses, the compression and tensile damage in the cylinders, the deformations in the concrete and the composites very closely illustrate the reality of the phenomena observed in the experimental, more particularly the damage and the rupture of the specimens, and clearly show that the deformations propagate progressively and are located in the unconfined zone of the cylinder.

Keywords: *FE analysis, partial confinement, concrete cylinder, Composites, rupture.*

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CALORIMETRIC MEASUREMENTS OF CARBON DIOXIDE ADSORPTION HEAT ON ACTIVATED CARBON

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ABSTRACT

Adsorption processes are widely used on an industrial scale for several important applications in catalysis, water treatment and fluid separations. For most separation systems, the adsorption is based on preferential sorption of selective components on the surface or within the cavities of sorbent materials. The commonly used adsorbents are molecular sieve zeolites, silica-alumina and activated carbon. Heat of adsorption can be directly or indirectly measured by calorimetric methods using isothermal or adiabatic systems. In spite of numerous investigations in recent years, which were devoted to the adsorption heat measurements at mild conditions for CO2 /activated carbon system, information related to the variation of CO2 adsorption and accompanied heat on activated carbon at high pressure is limited and the associated phenomena are not well understood. The aim of this work is to understand the relation between the adsorption properties, enthalpies estimation methods and CO2 interactions over activated carbon. Activated carbon is prepared from olive waste using ZnCl2 as chemical activation agents. The prepared samples develop a surface area of approximately 1270 m2/g, with 77% of which is a microporous surface. CO2 adsorption isotherms are carried out at different temperatures (20, 30, 40 and 50 Â°C) and at a pressure up to 15 bar. These experiments are combined with calorimetry to obtain a direct measurement of the CO2 interaction in the activated carbon. The isotherms are ï¬ • tted using various models. The Langmuir dual model appeared to be more representative of the CO2 adsorption evolution, showing the existence of two populations of adsorption sites. The average heat of adsorption is estimated at about 25 kJmol-1. The comparison with the heat of adsorption determined by the Clausius-Clapeyron relationship shows that the application of the latter gives only an approximation and depends on the pressure range and the amount of CO2 adsorbed.

Keywords: *activated carbon, calorimetry, Heat of adsorption*

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ETUDE DES CARACTERISATIONS STRUCTURALES ET LES TRANSFORMATIONS THERMIQUES DE LA STEATITE

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ABSTRACT

La céramique de stéatite est un silicate complexe de magnésium et d'aluminium, c'est un matériau très bien connu dans le domaine de l'isolation électrique. Elles restent stables sur une large gamme de fréquences (100 Hz Ã plus de 1010 Hz) [1]. Elle est très recherchée dans la fabrication des radiateurs de chauffage et de plaques de cuisson grÃ¢ce Ã sa conductivité thermique (6,4 W/mK), et Â Ã sa capacité calorifique (3 J/cmÂ³K). Le mélange expérimental (steatite) est préparé Ã partir de la palygorskite décarbonatée et de l'hydroxyde de magnésium précipité, désignés par ST. Cette dernière (poudre ST) est calcinée Ã des températures de 1200, 1250 et 1300Â°C,Â pour les analyses de diffraction des rayons X. Â Les échantillons de céramiques sont préparés par pressage uni axial. La poudre est pressée sous forme de cylindre de diamètre de 13 mm et d'épaisseur d'environ 3 mm, les pastilles sont frittées Ã une température de 1200Â°C pendant deux heures. L'identification des minéraux argileux et des phases cristallines synthétisées à haute température ont été déterminées par DRX, les compositions chimiques par FRX. L'analyse thermique ATD-TG est également utilisée. Le microscope électronique à balayage, pour l'observation des microstructures des céramiques. Les transformations thermiques de ST montrent clairement que l'ajout de magnésium favorise la synthèse de composés de silicate de magnésium du type enstatite et forstérite, et la cristobalite est totalement absente. La forstérite et la stéatite apparaissent clairement dès 1200°C, l'augmentation de la température jusqu'à 1300°C n'influence pas sur la cristallisation de ces phases. Le thermogramme ATD-TG enregistré pour ST présente un premier pic endothermique très important, vers 136 °C, montre la perte d'eau. Le dexième effet relativement important (pic vers 406 °C) témoigne le départ des hydroxyles structuraux. Les pics exothermique situé entre 623 et 1053 °C sont expliqué par la cristallisation des silicates-magnésin donnant d'autre phase comme, stéatite et forstérite .

Keywords: *céramique, stéatite, palygorskite, ATD, TG.*

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APPLYING OF HEAT TREATMENT TO AMELIORATE THE MICROSTRUCTURAL AND MECHANICAL PROPERTIES OF WELDED PIPELINE STEEL

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ABSTRACT

Welding is the most important method of joining components made of metallic materials. This method has been very successful, as evident in the popularity of the processing virtually all structural engineering applications. It becomes one of the most common processes used in manufacturing and engineering industries shipbuilding, pipeline fabrication among others. The welding process has been realized by industrial arc welding with circular weld seams. This work, presents some heat treatments were used to improve the microstructural and mechanical properties in different zones(base metal(MB); heat affected zone(HAZ) and fusion zone(FZ)) of the welded pipe line steel of grade API 5L X70. Scanning electron microscopy; X-Ray diffraction for residual stresses have been used as characterization techniques to observe the different properties in all zones of weld joint, in addition hardness and study of density of dislocations are also measured. The results revealed that the isothermal heat treatment caused progressive recrystallization reactions in the weld zone, phenomenon of fragmentation of the lamellar cementite in the fusion zone and the hardness values of the weld joint decreased. The study of residual stresses gives information about high compressive residual stresses. The density of dislocations are also extracted from the X-ray diffraction profiles, we obtained a decrease in the values of this later after the applied isothermal heat treatments.

Keywords: *microstructure, low carbon steel, heat treatment, welding*

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INVESTIGATION ON THE TRIBOLOGICAL BEHAVIOR OF TIN/CRN MULTILAYERS DEPOSITED BY PVD PROCESS

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ABSTRACT

TiN/CrN multilayers with variation of the modulation were deposited by magnetron cathodic sputtering in reactive environment on steel substrates with two different roughness levels in order to conduct investigations on improving the wear resistance of coated mechanical components. The study of the influence of the periodicity of the TiN and CrN layers was completed by mechanical and tribological characterization of the obtained deposits, using analysis methods and conventional measurements, namely : scanning electron microscopy (SEM) associated with energy dispersion spectrometry (EDS) and wave dispersion spectrometry (WDS); X-rays diffraction (XRD); Adhesion (Wad) and the hardness of the multilayers were obtained by scratch and nanoindentation tests, respectively. The tribological behavior of different coatings was characterized using a rotary tribometer. At the end of this work all of the results allow us to affirm the existence of a real correlation between deposition parameters and the properties of CrN/TiN multilayer coatings deposited by magnetron cathodic sputtering, and derive a significant improvement in wear resistance to meet the technological requirements of mechanical components.

Keywords: *mechanical properties, structure, TiN/CrN, PVD, tribological properties.*

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STUDY OF THE INFLUENCE OF THE CRYSTALLIZATION TIME OF A MOLYBDENUM-RICHE ALUMINO-BOROSILICATE GLASS ON THE FORMATION OF THE CAMOO4 POWELLITE.

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ABSTRACT

A ceramic for Mo confinement was synthesized in Al2O3-Na2O-B2O3-SiO2-MoO3 alumino-borosilicate system. The material is synthesized by double melting at 1380 °C for 3 h, followed by a nucleation stage at 530 Â° C for 2 h, and a crystallization stage at 615 ° C. The crystallization duration was optimized for times ranging from 2 to 72 h, with the aim of optimizing the nucleation of CaMoO4 powellite phase in the glass, and thus ensuring the double confinement of Mo in the crystalline phase embedded in the glass. The phases' identification performed by X-ray diffraction (XRD) analysis shows that up to 24 h of crystallization, powellite is the main formed phase in the glass, with more than 65%. Beyond 24 h, the powellite re-dissolves in the glass with a small amount crystallized in the form of phosphate. The scanning electron microscope (SEM) analysis made it possible to observe the formation of the powellite crystalline phase. Fourier transform infrared spectroscopy (FTIR) analysis of the materials shows the similarity of chemical composition between the different glass-ceramics obtained for the whole of crystallization times. The main vibrations evidenced by FTIR are those of Si-O-Si and B-O-B bonds of SiO4 and BO4 structural units, respectively; and O-Mo-O of MoO4 tetrahedrons. Raman spectroscopy analysis highlights the formation of powellite crystals in the glass, by the internal vibrations n1 (2A1) and n2 (2E) of MoO4 in CaMoO4.

Keywords: *powellite, rich radioactive waste, Mo, Glass ceramics, crystallization, FTIR.*

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EFFET DES CONDITIONS DE COUPE SUR LE PARAMETRE DE LA COURBE DU TAUX DE PORTANCE (RPK) LORS DU PROCEDE DE TOURNAGE DUR

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ABSTRACT

Aujourd'hui, le tournage dur apparaisse comme un procédé intéressant en usinage à sec, il présente un avantage majeur pour diminuer le coût total de l'usinage des pièces mécaniques de précision. En outre, la caractérisation de la texture de surface fonctionnelle par la norme ISO 13565 standard occupe une place importante dans la mécanique automobile. Dans ce travail, l'objectif principal est d'étudier l'impact des conditions de coupe (vitesse de coupe Vc, vitesse d'avance f et profondeur de coupe ap) du procédé de tournage dur (TD) sur le paramètre de la courbe du taux de portance (RPK). Pour cela, un outil de coupe en céramique a été utilisé. L'étude statistique qui repose sur la méthodologie de surface de réponse (MSR), l'analyse de variance (ANOVA) et la régression quadratique (RQ) sont réalisées afin de modéliser le paramètre de sortie et d'optimiser les paramètres de coupe d'entrés. Le plan d'expérience utilisé dans cette étude est le plan orthogonal L25 de Taguchi. Les résultats obtenus à partir de cette étude montrent que la vitesse de coupe (Vc) a un plus grand effet significatif sur le paramètre de la courbe de portance avec un pourcentage de contribution de 37,68%. Le deuxième paramètre significatif est la vitesse d'avance (f).

Keywords: *norme ISO 13565 standard, texture de surface, acier dur, tournage dur, courbe du taux de portance.*

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SYSTEME D'AIDE POUR L'EVALUATION DU MODELE DE L'ESTIMATION DE LA PERMEABILITE NON SATUREE DE BROOKS ET COREY 1964

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ABSTRACT

Les modèles de prédiction de la perméabilité non saturée proposée dans la littérature sont nombreux, et les études de comparaison entre ces modèles le sont aussiÂ ; dans le but de faciliter de telles études nous avons tenté de présenter un système expert qui s'occupe de l'évaluation de la méthode de Brooks et Corey 1964, en fonction des modèles d'estimation de la perméabilité saturé Â«Â Dane et Pockett (1992), Terzaghi (1981) et les données de laboratoireÂ Â». Notre système expert permet la comparaison entre les résultats de l'équation de Brooks and Corey 1964 pour un sol donnée sur la base de calcul de l'erreur quadratique moyenne.

Keywords: *Modèle Dane et Pockett (1992), perméabilité saturée, Système expert, modèle de Brooks et Corey 1964, perméabilité non saturée, Modèle Terzaghi (1981).*

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MECHANICAL BEHAVIOR OF SURFACE-TREATED UHMWPE FABRIC /EPOXY RESIN MULTILAYERED COMPOSITE PLATES

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ABSTRACT

Ultra-high molecular weight polyethylene (UHMWPE) fibers, as any other polyolefin, are chemically inert and have an extremely low surface energy because of the long linear nonpolar molecular chains and the high degree of crystallinity. This results in a poor interfacial adhesion between the UHMWPE fibers and the polymeric matrices. This investigation aims to evaluate the effect of the UHMWPE fibers surface treatment on the mechanical behavior of their related polymer-based composites. Herein, a new kind of multi-layered composite plates based on epoxy resin reinforced with surface-treated and native UHMWPE fabrics was prepared by a hand lay-up process. Potassium permanganate/nitric acid (KMnO4/HNO3) was employed to etch the surface of UHMWPE fabrics. The efficiency of the chemical surface treatment was confirmed by Fourier-transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM). After the surface modification, the roughness of the UHMWPE fibers was improved as well as the amounts of oxygen-containing groups in the fabrics. In order to highlight the influence of the acid etching on the mechanical performances, tensile and flexural tests were performed for samples consisting on 10-plies of native and surface-treated UHMWPE reinforced epoxy composites. The obtained results confirmed the superior properties of the surface treated UHMWPE-based composites. Indeed, the fibers surface modification allowed great possibilities of interaction between the polymeric matrix and the as such treated fibers. Meanwhile, the fractured surfaces of multi-layered plates studied by SEM further corroborated the mechanical findings. Finally, such high performances composites are suitable to be used in advanced applications requiring excellent mechanical performances.

Keywords: *Mechanical properties., composite material, Chemical treatment, UHMWPE fiber*

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CHEMICAL AND ELECTROCHEMICAL SYNTHESIS OF HYDROGEL

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ABSTRACT

Various strategies have been used in the preparation of hydrogels incorporation conducting polymers. The most frequently reported approach was based on the preparation of hydrogel of supporting polymer, which was subsequently used as a matrix for the preparation of conducting polymer. The conducting hydrogel was sometimes obtained even if the supporting polymer has not been gelled prior to the synthesis of conducting polymers. The penetration of a hydrogel matrix with a solution or colloidal dispersion of conducting polymers was a rarely used technique. In this contribution, we study hydrogels of Copolymer Formed from Piperazine and Aniline -poly(styrene sulfonate) (CO-Piperazine-Aniline/PSS) and Copolymer Formed from aminoterephthalic acid and Aniline â€“ NaPSS prepared at different molar ratio in concentrated solutions, hydrogels are synthesized in 1M HCl. Combination of electrochemistry, and X-ray photoelectron spectroscopy (XPS) ex-in situ is used to characterize both the chemical structure and the redox behavior of a hydrogel.

Keywords: *Piperazine., Aminoterephthalic, Polyaniline, Hydrogel*

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EFFECT OF INCLINED CRACKS ON THE BUCKLING AND FRACTURE BEHAVIOR OF COMPOSITE MATERIALS

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ABSTRACT

The hulls are particularly sensitive to external constraints or geometric instability, and their design is performed by using the finite element method. Indeed, these shells are sensitive to the slightest imperfection or geometric operations (accidental loads, temperatures, etc.). Taking into account the various damages generally led to a loss of bearing capacity. Â The buckling behavior of a crack, from an initial defect in a mechanically loaded three-dimensional structure, is characterized by the fact that the defect is a circumferential develop over time. The safety of establishments, including that of cylindrical tubes, requires the knowledge of such failure during loading. The concepts of security, using at the same time and the shape of the defenses of the circumferential crack and require the knowledge of the law of propagation. The definition of the cracking phenomenon caused by the inhomogeneity of composite materials, the mechanical and physical characteristics of their fiber and their matrix as well as the mechanical behavior of flanged hulls were presented in our work. The laminate considered for this study is carbon/epoxy. Using the finite element method, we will consider the behavior of the requested pipeline for buckling. The estimation and validation of the numerical calculation model are based on the concepts of fracture mechanics, using the ABAQUS code.

Keywords: *crack, finite element method, Buckling, material composite*

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FUSED DEPOSITION MODELING (FDM) PROCESSING OF A NOVEL BIOCOMPOSITE BASED ON PLA REINFORCED WITH CALCINED ALGERIAN COAST BIO-SHELL

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ABSTRACT

Among the techniques of Additive Manufacturing (AM) , fused deposition modeling (FDM), generally called 3D printing, has been attracted greater attention due to its low cost equipment, wide range material selection and easy processing.Â Particularly, PLA is the most used biopolymer for FDM due to its semi-crystalline feature, high elastic modulus and relatively low glass-transition temperature (Tg) in the range of 55â€“65Â°C. It is used to manufacture various components/objects that include biomedical devices. However, this biopolymer showed several drawbacks like its high brittleness and lower heat deflection temperature, which have to be overcame.Â¶ To date; a variety of fiber and particle reinforced polymer matrix composites containing newly developed fillers such as carbon nanofibers, inorganic whiskers, and nanoclay have been widely explored. However, the investigation of PLA composites reinforced with sintered Mediterranean Seashell waste did not reported yet for using them as FDM technique filaments, even that these bio-fillers exhibit many advantageous characteristics. In the present work, the effect of adding sintered Sea Shell into PLA matrix for applying in a 3D printing process based on FDM is studied in terms of calcination temperature and bio-fillers content. Since, the PLA bio-polymer was filled with 3, 7, 10 and 20 wt.% and the properties of the resulting composites were compared to those of the neat PLA matrix at a fixed extrusion conditions. Differential scanning calorimetry (DSC), X-ray diffraction (XRD) and SEM were utilized to study the crystallography of the prepared bio-composite. The structural characteristics are determined by means of FTIR and RAMAN spectroscopy. The evaluated properties of the newly developed bio-composites confirmed that the addition of calcined bio-shell fillers improved the inferior thermal and mechanical properties of PLA matrix. The prepared bio-composite can be used in several biomedical and bioengineered applications such as bony defect implant and bone fixture.

Keywords: *biocomposite, filler, bio, waste management, PLA feed stock 3D printing, FDM, material properties relation cheap.*

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EFFETS DES COUPLES DE CONTRAINTE ET DE LA PIESOVISCOSITE DU LUBRIFIANT SUR LE COMPORTEMENT STATIQUE D'UN PALIER LISSE COMPLIANT

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ABSTRACT

Le travail proposé s'intéresse Ã l'étude théorique et numérique des effets combinés de la présence des additifs améliorant l'indice de viscosité (VI), de la variation viscosité-pression et de la variation densité-pression sur le comportement statique d'un palier compliant de longueur finie fonctionnant en régime isotherme. La présence des additifs améliorant l'indice de viscosité rend le comportement rhéologique du fluide lubrifiant non newtonien, l'étude de l'écoulement de ce type de fluide est basée sur l'application de la théorie de Vijay Kumar Stokes. La loi de Barus, la loi de Dawson et Higginson et le modèle couche élastique mince seront retenus pour tenir compte Ã la fois des effets de la variation viscosité-pression, de la variation densité-pression et les déformations élastiques de revÃªtement de l'alésage dans l'étude paramétrique. Pour les mÃªmes valeurs du paramètre des couples de contraintes, la piézoviscosité du fluide lubrifiant conduit Ã une augmentation du pic de pression dans le film et de la portance hydrodynamique du palier surtout si le palier lourdement chargé et la compressibilité du fluide n'a pas des effets significatifs sur le champ de pression dans le film lubrifiant. On peut conclure que la piézoviscosité du fluide lubrifiant ne peut Ãªtre négligée pour la prédiction des performances statiques ou dynamiques des paliers fluides sévèrement chargés oÃ¹ les effets de la piésoviscosité deviennent importants. Par comparaison aux huiles newtoniennes, les huiles additivées permettent d'une part une augmentation importante du pic de pression dans le film lubrifiant et de la portance hydrodynamique surtout pour les grandes valeurs des chaines moléculaires relatives des additifs et de l'excentricité relative statiqueÂ et d'autre part une diminution du nombre de frottement dans le film et le débit moyen d'écoulement de fluide pour les grandes valeurs de l'excentricité relative statique

Keywords: *RevÃªtements de surfaces, Théorie de V.K Stokes, Couples de contraintes, Fluide non newtonien, Paliers fluides*

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NEW SYNTHESIS OF TIO2/ PVDF-TRFE NANOCOMPOSITES FOR PHOTOCATALYTIC DEGRADATION OF ATENOLOL UNDER SOLAR RADIATION

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ABSTRACT

The incorporation of nanostructured photocatalysts in polymers is a strategic way to obtain novel water purification systems. This approach takes the advantages of: (1) the presence of nanostructured photocatalyst; (2) the flexibility of polymer; (3) the immobilization of photocatalyst, that avoids the recovery of the nanoparticles after the water treatment. Here we present TiO2-polymer nanocomposites with high photocatalytic performance and stability. Poly(vinylidenefluorideâ€“trifluoroethylene)P(VDFâ€“TrFE) is one of the most commonly used as copolymer membrane. This Fluorinated copolymer allows the production of membranes with controlled porosity and pore size. The poly(vinylidene difluoride)-co-trifluoroethylene (P(VDF-TrFE)) membranes containing titanium dioxide P25 were prepared by solvent casting was performed so to obtain TiO2/ PVDF-TrFE nanocomposites. A complete morphological, structural, and chemical characterization was made by scanning electron microscopy (SEM), X-ray spectroscopy (EDS), X-ray diffraction (XRD), contact angle measurements and Fourier transform infrared spectroscopy(FTIR). The remarkable photocatalytic efficiency of the nanocomposites was demonstrated by the degradation of atenolol under sunlight irradiation over five hours,with 84% of the pollutant being degraded. The composites also resulted reusable and stable, since they maintained an unmodified photo-activity after several atenolol digradation runs. Thus, these results demonstrate that the proposed TiO2/ PVDF-TrFE nanocomposite is a promising candidate for photocatalytic applications and, in particular, for novel water treatment.

Keywords: *TiO2/PVDF, nanocomposites, Photocatalytic, TrFE membrane, Water Remediation.*

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THE STUDY MECHANICAL PROPRIETIES OF TI-N ON MACHINES STEEL SUBSTRATES

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ABSTRACT

Recently, the modern technologies are based on the exploitation of the typical thin film properties (adhesion, thermal stability, low porosity, desirable stoichiometry), which are strongly developed and become one of the most important industrial interests. For example, TiN coatings are usually used for edge retention and corrosion resistance on machine tools. Titanium nitride coatings also discover applications in nuclear industry as hardfacing material because of their high thermal stability. The aim of this work is to develop and characterize, Titanium nitride thin films, which deposited by the magnetron sputtering method on silicon and XC100 steel substrates, containing 1% wt. of carbon. The influence of thin films on the structural and mechanical properties of the coatings was determined by EDS, WDS, DRX, MEB, Nano-indentation, alternative tribometer and Scratch test. By varying time deposition between 20 and 180 min, it's thus formed of titanium nitrides. It is expected a significant improvement in mechanical properties such as hardness and adhesion. The interest study of the mechanical behavior of these titanium films on this steel type and in this range of film thickness (260- 2500 nm) is particularly due to the fact that, the obtained hardness and adhesion in this area are very important. Also, the deposited titanium films on the XC100 steel, shows that the hardness achievement in the inter-critical area is as important as that obtained in the austenitic phase. Indeed, the change in the phase's proportion in leads to a phase transformation which causes by the increase in the hardness.

Keywords: *structural, sputtering magnetron, Mechanical property, N, Ti, tribological behavior*

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STUDY OF SURFACE ROUGHNESS AND WEAR MECHANISM IN MACHINING PROCESS WITH COATED AND UNCOATED CARBIDE CUTTING TOOL

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ABSTRACT

This paper presents the case study of a wear mechanism in turning processes with coated and uncoated carbide cutting tools. The wear mechanisms of different carbide cutting tools were investigated in machining of AISI 4140 workpiece materials at different cutting conditions. The tools failed primarily due to wear on the flank and rake faces. The failure mode of the carbide cutting tools was similar regardless of the machining operations and coating is believed to enhance the tool life, but once removed, the tool fails similar to that with the uncoated tool. Results also indicated that the coated tool out performed uncoated tool in terms of tool life and surface finish.

Keywords: *tool life, coated carbide, turning, wear mechanism, surface roughness*

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MICROCRYSTALLINE CELLULOSE NITRATE FROM ALGERIAN POSIDONIA OCEANICA BROWN ALGAE: SYNTHESIS, CHARACTERIZATION AND KINETIC MODELING

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ABSTRACT

The traditional cellulose nitrate commonly known as nitrocellulose (NC) is the most widely used energetic ingredient in military and civilian applications. This conventional NC was mainly prepared from cotton or wood; however it presents many shortcomings such as low combustion temperature, high friability and low lubricity. One approach to overcome these drawbacks is the structural modiï¬•cation of cellulose, which is the polymer precursor used for the preparation of NC. In this study, microcrystalline cellulose nitrate (MCCN) was successfully obtained from cheap available and easily renewable marine plant, which is posidonia oceanica brown algae (POBA). Fourier transform infrared spectroscopy (FTIR) results showed alterations in the intensities of some absorption bands, suggesting a signiï¬•cant difference in the chemical structure between traditional NC and MCCN samples. X-ray diffraction (XRD) measurements indicated that MCCN samples were more crystalline than the traditional NC samples. According to the scanning electron microscopy (SEM), both traditional NC and MCCN revealed compact structure and a rough surface. In comparison with conventional NC samples, MCCN samples exhibited high density, high nitrogen content, low degree of polymerization and good thermal stability, what corroborating the results obtained by non-thermal and thermal techniques. On the other hand, kinetic modeling based on DSC data has been carried out by isoconversional analysis to determine the kinetic triplets. It was found that the MCCN samples present the lowest average activation energy. This work opened a new pathway to prepare MCCN from an abundant marine biosource (POBA), and it could be expected to have applications in several areas such as propellants, energetic binders and gas generators.

Keywords: *Thermal kinetic parameters., Microcrystalline cellulose nitrate, Characterization, Synthesis, Cellulose nitrate, Posidonia oceanica brown*

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STUDY OF THE ADSORPTIVES PROPERTIES OF ZEOLITES X EXCHANGED BY THE CATIONS CU2+ AND/OR ZN2+

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ABSTRACT

L'étude présentée dans ce manuscrit est consacrée à la modification chimique d'une zéolithe X par échange cationique. L'échange ionique de la zéolithe NaX par les cations Zn2+ et/ou Cu2+ est progressivement mené en suivant l'évolution de certaines de ses caractéristiques: cristallinité par DRX, volume microporeux par adsorption d'azote... Une fois caractérisés, les différents échantillons vont servir à l'adsorption de propane et de propylène . Une attention particulière est ensuite portée sur la modélisation des isothermes d'adsorption. Dans ce contexte, diverses équations d'isothermes d'adsorption sont utilisées pour décrire les isothermes expérimentaux. La dernière partie est dédiée à l'étude des propriétés acides de Cu(x)X, Zn(x)X et CuZn(x)X, grâce à l'adsorption-désorption de pyridine suivie par IR. Le choix de la zéolithe s'explique par le fait que des zéolithes, présentant un rapport Si/Al aussi bas que celui de la NaX, ont une affinité nettement plus grande pour l'introduction de cations polyvalents. Par ailleurs, l'introduction des ions Zn2+ ou/et Cu2+, dans la zéolithe, par échange cationique, modifie le comportement adsorptif et catalytique de ces solides. L'effet du remplacement à différents taux des ions Na+ par les cations Cu2+ et/ou Zn2+, sur la cristallinité ainsi que sur les propriétés texturales a été traité. Quelques résultats sur la morphologie des cristallites ainsi que sur les effets thermiques lors d'une élévation de température, obtenus par microscopie électronique à balayage et par analyseur thermique ATD-ATG, respectivement, sont également reportés. L'acidité de nos différents échantillons a été aussi étudiée. C'est ainsi que la nature et la force de chaque type d'acidité sont estimées. L'évaluation de ces différentes caractéristiques permettra d'établir une comparaison entre Cu(x)X, Zn(x)X et CuZn(x)X.Une étude sur L'adsorption de C3H8 et C3H6 par NaX , Cu(x)X, Zn(x)X et CuZn(x)X a été abordée

Keywords: *ion exchange, zeolite, Adsorption, acidity*

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EFFECT OF THE BINARY AND TERNARY EXCHANGES ON CRISTALLINITY AND TEXTURAL PROPERTIES OF X ZEOLITES.MODIFICATION, CHARACTERIZATION AND APPLICATION

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ABSTRACT

L'échange ionique de la zéolithe NaX par les cations Cu2 + et / ou Zn2 + est progressivement guidé par le développement de certaines de ses caractéristiques: cristallinité par diffraction des rayons X, profil des isothermes, critère de RI, chaleur d'adsorption isostérique et volume microporeux Ã l'aide du Dubininâ€“ L'équation de Radushkevich (DR) et le t-plot selon la méthode de Lippens â€“ de Boer qui permet également de déterminer la surface externe. Les résultats montrent que le processus d'échange cationique, dans le cas de Cu2 + introduit Ã un degré plus élevé, s'accompagne d'une dégradation cristalline de Cu (x) X, contrairement Ã la zéolite X échangée Zn2 +. Cette dégradation se produit sans présence significative de mésopores, car Les valeurs des critères RI se sont révélées très inférieures Ã 2,2. Une comparaison entre les échanges binaires et ternaires montre que les courbes de CuZn (x) X sont nettement inférieures Ã celles de Zn (x) X et de Cu (x) X, quel que soit le paramètre examiné. Par contre, les courbes relatives Ã CuZn (x) X tendent vers celles de Cu (x) X. Cela confirmerait Ã nouveau la sensibilité de la structure cristalline de CuZn (x) X vis-Ã -vis de l'introduction de cations Cu2 +. Un résultat original est la distorsion du cadre zéolitique des zéolithes X au degré d'échange moyen, lorsque Cu2 + entre en compétition avec un autre cation divalent, tel que Zn2 +, pour l'occupation de sites répartis dans des cavités zéolithiques. En d'autres termes, l'échange ternaire accentue la dégradation cristalline des zéolithes X. Un résultat inattendu est également l'absence de corrélation entre les dommages causés aux cristaux et la surface externe.

Keywords: *zeolite, ion exchange, crystallinity, Adsorption*

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PREDICTION OF TENSILE RESPONSE OF WATER AGED FLAX FABRIC-REINFORCED THERMOPLASTIC AND THERMOSET RESINS

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ABSTRACT

In this work, a straightforward mathematical approach is proposed to model the tensile behaviour of two water aged flax fabric-reinforced thermoplastic and thermoset resin composites. For this purpose, the studied composites were manufactured using the vacuum infusion technique and aged into tap water at room temperature until saturation. Next, they were subjected to several monotonic tensile tests after different ageing period in order to determine their mechanical behaviour. Their tensile properties and their evolution with ageing time were also assessed. An elastic damage model was considered to predict their tensile behaviour and estimate their related parameters (young modulus, maximum strength and strain) as a function of water immersion time. A good agreement between the model and the experimental curves was observed in particular for composites based on the thermoplastic resin.

Keywords: *damage, water ageing, tensile behaviour, reinforced composites, Flax fibre, modelling.*

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INFLUENCE OF NITROGEN CONCENTRATION ON STRUCTURE AND PROPERTIES OF V-N COATINGS

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ABSTRACT

Almost transition metal nitrides are hard and wear resistant coatings materials, which are applied to cutting and forming tools operating in an abrasive wear environment. Among them, Vanadium nitrides offer a unique combination of properties by exhibiting a high corrosive resistance against aggressive media, and an oxidation resistance in ambient air at high temperature. The mechanical properties of the films are essentially influenced by the crystallographic structure, which is established during the deposition of the film. V-N films with an almost stoichiometric composition exhibit cubic or hexagonal structures and hence present higher hardness values than the other nitrides films. In this work, we investigated the effect of nitrogen concentration on the structure and properties of V-N coatings deposited by magnetron sputtering. The structural and morphological properties of V-N films were described, and followed by a detailed investigation on the mechanical properties of V-N coatings. By varying the nitrogen percentage, the structure and the hardness of V-N films were evaluated in a wide range. With rising N2 injected in the deposition chamber, the structure changed from V2N at 10 % N2 to a mixture of V2N and VN at 20 %N2. The hardness of the films first augmented with increasing the nitrogen percentage and take a maximum value was 26 GPa for the films deposited under 20 %N2 then decreased. The friction coefficient and the wear rate take minimum values of 0.42 and 3.6.10.6m3/Nm, respectively, for 20 % N2.

Keywords: *Friction coefficient., Magnetron sputtering, Microstructure, Mechanical properties, Vâ€“N films*

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EXTRACTION, CARACTERISATION AND THEORITICAL STUDIES OF THEOBROMINE

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ABSTRACT

Theobromine, is a colorless alkaloid, is a well-known compound that occurs in coffee, tea, kola nuts, mate leaves, paste, cocoa beans, and other related natural products. Theobromine is well experimentally studied molecule in the food and pharmaceutical industries. However, there are not many studies on theobromine properties in the neutral, cationic, and anionic states. For this reason, it's very important to know the properties of this molecule in different forms. In this study, we present in the first time the extraction of theobromine from cocoa, than, this molecule was studied, for neutral, cationic, and anionic forms, using quantum chemical calculations by Density Functional Theory (DFT), at at B3LYP/6-31G(d,p) level, both in vacuum and with the water solvent to estimate the most stable forms. The different proprieties for each form have been analyzed by means of HOMO-LUMO to determine the energy gap (âˆ†), Electron affinity (A), Ionization potential (I), Global Electrophilicity (Ï‰), Global Hardness (Î·) and Chemical Potential (Âµ). In addition Mulliken atomic charges, dipole movements, NLO proprieties of the each form compound were calculated and discussed.

Keywords: *Theobromine, Extraction, DFT, Neutral form, Cationic form, Anionic form*

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ELABORATION AND CHARACTERIZATION OF ZN-NI LAYERS ELECTRODEPOSED ON SUBSTRATE OF A LOW ALLOY STEEL

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ABSTRACT

The objective of this work is to study the effect of certain factors such as the nickel concentration in the electrolyte, the electrolyte temperature and the current density in order to improve the mechanical properties, morphology of the surface of The zinc - nickel alloy was deposited on a mild steel substrate to protect against corrosion by using a chloride bath, and to study their behavior in the corrosive medium. The use of X-ray diffraction and SEM gave us information about the morphological and crystalline structure of the alloy showed that the concentration of nickel in the electrolyte played an important role in obtaining alloy zinc - nickel has good mechanical properties and high corrosion resistance, provided that no more than 25% inside the electrolytic bath.

Keywords: *Electroplating, Morphology, Ni alloy, Zn, Corrosion*

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ETHANOL DEHYDROGENATION REACTION ON MODIFIED COPPER BASED CATALYST

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ABSTRACT

The bioethanol production from biomass has gained a considerable attention this last decade, because of its use as an alternative to fossil fuels. Its large availability and its biodegradability made it a building block for biorefineries and clean industrial technologies. For instance, the dehydrogenation of ethanol seems to be the most promising route, since it occurs at relatively mild conditions and generates value-added chemicals such as acetaldehyde which is a versatile chemical intermediate, ethyl acetate largely employed as a solvent in many industrial products, as a green alternative, replacing the harmful aromatic compounds and pure hydrogen used directly in many industrial processes. The aim of this study is to investigate the effect of adding a second metal such as Ag, Co, Ni, Cd and Pt to a copper based catalyst supported on silica, on the ethanol dehydrogenation reaction performed at atmospheric pressure and a temperature range of (180-300Â°C). The catalysts synthesized by precipitation method were characterized using various physico-chemical methods SEM, XRD, ATG-DSC and Fluorescence X. The results revealed that the predominant product of the reaction for all catalysts was acetaldehyde and the most active and selective one was Ag-Cu/SiO2 with a selectivity of 79 % at 76 % conversion of ethanol at 240 Â°C and W/F of 0.01 g min/ml. The time on stream test performed during three days using the most active catalyst showed that adding Ag to Cu enhance the stability of this later and this was probably due to the reduction of sintering phenomena of copper crystallites. According to this result Ag-Cu/SiO2 represent a promising catalyst for the production of acetaldehyde by ethanol dehydrogenation and studying the action of Ag on this type of catalysts is a must.Â

Keywords: *acetaldehyde., Cu/SiO2, dehydrogenation, Ag, Ethanol*

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SYNTHESIS OF NEW BIO-BASED BENZYL DERIVATIVES OF XANTHAN GUM USING GREEN SOLVENTS.

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ABSTRACT

Biomaterials such as polysaccharides are preferred to synthetic products due to their biocompatibility, low cost and availability. Xanthan gum is an anionic natural polysaccharide produced by the bacterium Xanthomonas Campestris. Xanthan is widely used in different fields, such as food, cosmetic and pharmaceutical industries due to its suspending proprietyie due its high viscosity. Chemical modification of this natural polymer may be necessary to develop novel functions that would allow for a wider range of applications such as surface activity. The aim of the present study is to synthesize a hydrophobically modified and potentially amphiphilic derivatives of xanthan gum (XG) with different degrees of substitution. Various benzyl xanthan derivatives (BX) have thus been developed by an etherification reaction using the Williamson synthesis strategy between xanthan gum (XG) and benzyl chloride (BCL) using green solvents, namely ethanol and water as reaction mediums. The effect of temperature, solvent and molar ratio (R = BCL/ XG) on reaction and degree of modification were studied. The obtained products were subjected to a physical-chemical characterization such as infrared analysis, conductivity and viscosity measurements, antimicrobial testing and emulsifying power. The results showed an optimal modification of the two derivatives BX2 and BX3 obtained respectively at the temperatures of 70 and 90 Â° C., both synthesized in a heterogeneous ethanolic (Ethano+Water) medium. The viscosimetric testing demonstadted that all BXG derivatives exhibit a shear-thinning behavior.The emulsifying proprieties and antimicrobial effect of these new hydrophobically modified polymers on the bacteria Staphylococus aureus are also very appreciable.

Keywords: *Polysaccharides, Xanthan gum, Benzylchloride, Etherification, Emulsification*

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CORROSION INHIBITIVE ACTION OF METHIONINE ON CUÂ€“30NI ALLOY IN AERATED 0.5M H2SO4

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ABSTRACT

Corrosion inhibition of Cu-30Ni alloy in aerated 0.5M H2SO4 solution by methionine, an amino acid, has been investigated. Potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) were performed at open circuit potential. Corrosion current density was also determined from colorimetric experiments. Voltammetric curves showed that Methionine addition to 0.5M H2SO4 affects largely the cathodic process; shifting the corrosion potential to more negative values and decreasing significantly the corrosion current density. The inhibiting efficiency reaches a value of 91% at inhibitor concentration of 10â˜3 M. Impedance data reveals the adsorption of the inhibitor and the surface relaxation process due to nickel. Polarization resistance deduced from impedance measurements and voltammetric experiments are in a good agreement.

Keywords: *Adsorption, Cupronickel, Faradic capacitance, Impedance spectroscopy*

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NEW TYPE ANTICORROSIVE WATER BORN PAINT BASED ON SOYA BEAN OIL ALKYD DISPERSION

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ABSTRACT

Novel anticorrosive water born paint based on stable soya bean oil alkyd dispersion have been succefully prepared. Aniline monomer has been successfully polymerized via chemical oxidative technique in presesnce of modified montmorillonite clay MMMT under vigouros stirring at 10,000 rpm to yield stable colloidal dispersion of polyaniline/ modified montmorillonite nanocomposite (PANI/MMMT). The prepared PANI/MMMT nancomposite dispersions of different weight percent Wt % have been used as corrosion inhibitor additives for water born paint formulations based on soya bean alkyd dispersion as binder. Polyaniline colloidal dispersion of different Wt% have been also used as corrosion inhibitor additives for comparison. The prepared materials have been elucidated and characterized via FT-IR, UV-VIS, SEM, TEM and TGA. The physico mechanical properties as well as anticorrosion properties of the painted films under study have been investigated. The obtained results revealed that the physico-mechanical properties of the final paints have not been affected by the presence of the prepared nanocomposite of different Wt%. The results revealed also that in addition to, the strong adhesion properties of the present soya bean oil alkyd dispersion binder, the presence of 12 Wt % of the prepared nanocomposite gave the best anticorrosion results due to the double redox and barrier effect of both PANI and MMMT respectively. This new type paint is easy to process and cost effective. As far as we know none of the commercial paints developed recently could achieve any of these characteristics. And no applied usage of such water based anticorrosive paint has been reported in literature.

Keywords: *Alkyd dispersion, polyaniline, modified montmorillonite, nanocomposite and anticorrosive paint.*

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UTILIZING SYNTHETIZED HYDRAZONE AS AN EFFECTIVE CORROSION INHIBITOR FOR CARBON STEEL IN 1M HCL SOLUTION

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ABSTRACT

This study concerns with carbon steel corrosion inhibition in 1M HCl solution protected with different concentrations of hydrazone derivatives. Electrochemical measurement is utilized. According to the electrochemical impedance spectroscopy (EIS) test results the maximum inhibition efficiency of about 90% was obtained in the solution containing 10-3 M. Potentiodynamic polarization test results revealed that in the presence of the tested compound the rates of anodic steel dissolution and cathodic hydrogen evolution reactions significantly decreased and a mixed inhibition effect was obtained. Surface analysis was done by scanning electron microscopy (SEM). Results revealed that the steel surface damage as a result of HCl solution attack significantly decreased by the addition of hydrazone derivative.

Keywords: *hydrazone derivative, corrosion inhibitor, EIS, SEM*

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STUDY OF DYNAMIC BEHAVIOR MILLING FOR FOR AN ALUMINUM ALLOY PART OF TYPE 6061-T6

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ABSTRACT

During a machining operation, the cutting forces cause a relative movement between the part and the tool that melts the various cutting forces. This phenomenon, called regenerative vibration (self-sustaining), greatly affects the tool life and surface condition of the part.Traditional regenerative stability theory predicts a set of optimally stable spindle speedsat integer fractions of the natural frequency of the most ï¬exible mode of the system. Being able to predict these phenomena therefore makes it easier to choose cutting conditions in order to improve productivity. Over the past twenty years, many theoretical models have been developed for various applications, but there have been very few studies on the particular case of three-axis milling. In this research, it is planned to study the stability of milling operations using a hemispheric tool, using differential equations of delay terms. In this article, a different model is proposed compared to the existing models for peripheral milling and for an aluminum alloy part of type 6061-T6.

Keywords: *Machining stability, Three, axis milling, Stability lobe, Left surface, Semi discretization.*

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ELABORATION ET CARACTERISATION THERMIQUE ET HYGROTHERMIQUE D'UN STRATIFIE RENFORCE PAR DES FIBRES NATURELLES (JUTE, SISAL)

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ABSTRACT

Dans le contexte de développement durable et de protection de l'environnement, les fibres végétales ont été transformées en fibres synthétiques afin de fabriquer des matériaux bio-sourcés et respectueux de l'environnement et de la santé publique. Les matériaux biosourcés Ces études ont révélé que biosourcéspeuvent atteindre les propriétés intéressantes, tout en voulant que le coÃ»t des composites soit significatif. Ce qui lui semble pouvoir Ãªtre compétitif avec les fibres synthétiques. Mais ils n'ont pas connaissance de leur comportement, ils sont endommagés et ils ont une limite d'utilisation dans le secteur de l'industrie. Dans cet article, stratifié Ã base de fibres naturelles de type jute, sisal et résine thermodurcissable l'époxy. Dans une première étape, le renfort utilisé est une caractérisation mécanique avant le tisser artisanalement. The stratifiéized by infusion is polymérisé in a temperature of 80 Â° c pendant 8 hours. Ensuite ont été caractérisées par une analyse thermique différentielle, une analyse gravimétrique et une étude de la stabilité dimensionnelle par dilatométrie, de la perte de masse et du taux d'absorption d'eau. époxy. Dans une première étape, le renfort utilisé est une caractérisation mécanique avant le tisser artisanalement. The stratifiéized by infusion is polymérisé in a temperature of 80 Â° c pendant 8 hours. Ensuite ont été caractérisées par une analyse thermique différentielle, une analyse gravimétrique et une étude de la stabilité dimensionnelle par dilatométrie, de la perte de masse et du taux d'absorption d'eau. époxy. Dans une première étape, le renfort utilisé est une caractérisation mécanique avant le tisser artisanalement. The stratifiéized by infusion is polymérisé in a temperature of 80 Â° c pendant 8 hours. Ensuite ont été caractérisées par une analyse thermique différentielle, une analyse gravimétrique et une étude de la stabilité dimensionnelle par dilatométrie, de la perte de masse et du taux d'absorption d'eau.

Keywords: *gravimetric, hygrothermal, epoxy, natural fibers, composites*

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INFLUENCE DU TAUX DE CHARGE «NOIR DE CARBONE» SUR UNE FORMULATION A BASE DE CAOUTCHOUC NATUREL

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ABSTRACT

L'utilisation des élastomères couvre un large domaine d'application (colle, étanchéité, semelle de chaussures, article sportif, automobile et pneumatiques). Cela s'explique par les propriétés mécaniques uniques d'élasticité, d'extensibilité et leur capacité Ã dissiper de l'énergie. Les nombreuses formulations possibles offrent la possibilité de mettre en Å“uvre des matériaux très spécifiques en fonction de l'application désirée et l'obtention des formes les plus complexes. Le but de ce travail est de trouver le taux de noir de carbone qui correspond aux meilleures propriétés mécaniques. Après avoir tracé les différentes courbes des essais en fonction du taux de charge, nous avons aboutis aux résultats donnés dans la littérature. Il s'est avéré que les propriétés mécaniques du caoutchouc naturel dépendent du taux de charge de noir de carbone. Dans notre travail de recherche, on a utilisé deux types de NC (NC220) et (NC550), de ce fait on constate que les résultats de NC220 sont meilleurs que ceux du NC550 et tout Ã§a dépend de la taille des grains. Plus la taille des particules est petite plus la surface spécifique est grande. Pour le noir de carbone est de quelques m2/g Ã 150m2/g. plus la surface spécifique est grande plus le renforcement potentiel est important.

Keywords: *élastomères, propriétés mécaniques, caoutchouc naturel, noir de carbone*

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AN APPROACH TO HDPE PIPE HETEROGENEITY USING J-INTEGRAL ENERGY AND ESSENTIAL WORK OF FRACTURE

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ABSTRACT

High density polyethylene (HDPE) pipes are usually manufactured using the extrusion process. Such production process is known to generate morphological and internal stress variances through the pipe wall. The aim of this study is to investigate experimentally the fracture energies of high resistant HDPE-100 pipe at the outer and inner layers. Initially, the method consists in machining, at specified cutting conditions, concentric pipes envelopes from which outer and inner layers are extracted. Secondly, both the J-integral parameter (JIC; kJ/m2) and the essential work of fracture (EWF; kJ/m2) are measured from stress-strain experiments based on DENT specimens. Experimental results showed that JIC progressed from 20.0 up to 27.2 kJ/m2 respectively for the inner and outer pipe layers indicating a better resistance to fracture of the outer pipe layers. Similarly, corresponding EWF measurements for inner and outer layers evolved from 38.8 to 48.9 kJ/m2. The latter results are in the same trend with those of JIC. These variations are in accordance with the heterogeneities of mechanical properties (elastic modulus, yield stress, failure stress...) and structural properties (crystallinity, crystallites size...) as illustrated in the literature for tensile tests using specimens extracted via the similar machining technique. Â

Keywords: *J, EWF, fracture energy, Polyethylene pipe, integral, outer pipe layer, inner pipe layer.*

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EFFECT OF REINFORCEMENT SHEAR AND BUCKLES DEFECTS ON THE LOW VELOCITY IMPACT BEHAVIOR OF A COMPOSITE

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ABSTRACT

This paper presents an experimental study of the effect of mesoscopic buckles defect and shear deformation of the reinforcement, which result from shaping, on the low velocity impact behavior of a composite laminate. The material studied is a glass/polyester composite with three layers of mat and one layer of taffeta fabric. To assess the properties induced on the final composite, plates with calibrated defects and deformations were manufactured. Results of the impact tests and observations performed on the materials with calibrated defects identified a negative effect of buckling on elastic parameters and revealed greater damage relative to the healthy material. The reinforcement shear had a beneficial effect on the impact properties of the laminate, which was attributed to the increase in local fiber density.

Keywords: *Impact, Defects, textiles, Laminates, Induced properties*

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ANALYSES OF THE MICROMECHANICS OF STRESS TRANSFER IN SINGLE FIBER PULL-OUT TESTS

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ABSTRACT

Fibre-matrix interface is known to have contribution to the mechanical performance of fibre-reinforced composite by its potential for load transfer between the fibre and the matrix. This paper presents an overview of various analytical models developed to study the pullout (push-back) behavior of a fiber embedded in a matrix block to characterize the fiber/matrix interfacial adhesion. Two approaches can be distinguished: one based on a maximum stress criterion (shear lag) and the other based on fracture mechanics. This article gives an overview of the analytical models reported in the literature to measure the shear strength at the interface, the parameters influencing these properties, the geometry of the model, embedded length of the fiber, fiber diameter and loading conditions (opening width between the knife-edges for example), including components (fiber, matrix, interface), manufacturing route and the resulting defects.

Keywords: *Interface, pull, out, interfacial shear strength, micro, indentation, damage*

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MODÉLISATION DU COMPORTEMENT DES SOLIDES SOUS CHARGEMENT CYCLIQUE PAR UN MODÈLE ELASTOPLASTIQUE

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ABSTRACT

L'objectif de ce travail de recherche est l'étude sur un modèle qui généralise les lois d'écrouissage isotrope et cinématique. Le modèle en question est représenté par un champ de modules d'écrouissage correspondant à l'introduction de la configuration des surfaces d'écoulement. Pour des cas des chargements complexes, et particulièrement dans le cas de chargement cyclique, la configuration instantanée peut être déterminée par sa position, son centre, sa taille, les composantes du vecteur unitaire normal et le module elastoplastique à partir du calcul de l'incrément de déformation à chaque incrément de contrainte. A partir des résultats obtenus, nous pouvons conclure qu'on peut actualiser à chaque instant et pour chaque surface d'écoulement ses dimensions. D'autre part, le programme élaboré traite l'identification de la surface d'écoulement pour un point de chargement ou déchargement quelconque. Pour cela, nous avons établi un algorithme qui permet la détermination des caractéristiques de la surface d'écoulement auquel le point de chargement appartient. L'intérêt de ce modèle réside dans son très faible nombre de paramètres et ce, par rapport aux autres modèles de plasticité avec écrouissage. Étant donné la complexité de la plasticité non linéaire, nous souhaitons de poursuivre ce travail par le modèle de Mroz pour le chargement multiaxiale et cyclique et, de voir la possibilité d'intégrer d'autres facteurs qui influent sur la déformation de la surface d'écoulement.

Keywords: *Plasticité cyclique, Elastoplasticité tridimentionnelle, Surfaces d'écoulement plastique, Module elastoplastique*

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ETUDE DE L'EFFET DE L'AJOUT DE GRANULATS DE CAOUTCHOUC (ISSUS DE DECHETS) SUR LE COMPORTEMENT DES BETONS DE SABLE (DE DUNES) AUTOPLAÇANT

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ABSTRACT

L'idée de réaliser des bétons de sable auto-plaçant (BSAP) est proposée dans le but d'intégrer les bétons de sable dans la nouvelle technologie des bétons auto-plaçant et en même temps de valoriser les sables locaux, notamment le sable de dunes, disponible en grandes quantités dans les régions sud de l'Algérie. Ce travail porte essentiellement sur la valorisation des bétons base de sable, et l'incorporation de poudrettes de caoutchouc (0-1 mm) et granulats de caoutchouc (0-4 mm) issus de recyclage de pneus usagés en substitution volumique du sable avec des taux de 10, 20 et 30% afin d'obtenir des matériaux à faible impact environnemental. Afin de répondre à cet objectif, une démarche expérimentale a été réalisée, elle a consisté à incorporer différents pourcentages de poudrettes de caoutchouc et granulats de caoutchouc dans la formulation des bétons de sable. Ces bétons sont caractérisés à l'état frais et durci afin d'étudié l'effet d'ajout de ces granulats et poudrettes sur les propriétés du béton de sable auto-plaçant. Les résultats trouvés montrent que la fluidité des BSAP (exprimée par l'étalement au cône d'Abrams et l'écoulement à l'entonnoir V-Funnel) s'améliore en fonction de l'augmentation du dosage de poudrettes et granulats de caoutchouc et ces valeurs sont situées à l'intérieur des recommandations de l'Association Française de Génie Civil (AFGC). Ils montrent aussi que les particules de caoutchouc peuvent améliorer certaines caractéristiques techniques souhaitées comme la ductilité.

Keywords: *béton de sable ; autoplaçant ; déchets de caoutchouc ; propriétés ; valorisation*

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