Fourth International Meeting

On Dielectric Materials Marrakech, Morocco, 29 -31 May 2013

Organized by

Faculty of Sciences Semlalia

Cadi Ayyad University, Marrakech Morocco

Faculty of Sciences Kenitra

Ibn Tofail University, Kenitra, Morocco

Laboratoire des Matériaux Composites Céramiques et Polymères, Sfax, Tunisia

Foreward

On behalf of the organizing committee, we would like to welcome you to the Faculty of Sciences Semlalia-Marraekch, the host of The Fourth International Meeting on Dielectric Materials (IMDM'4).

The goal of the IMDM'4 conference is to provide a platform for researchers, scientists from all over the world to exchange ideas on recent progress and developments in dielectric materials and their applications. It is addressed to the materials scientist, physicist, chemist, biologist, and electrical engineers engaged in fundamental and applied research work or in technical investigations on such materials. The IMDM'4 meeting will also be an opportunity to boost the existing scientific networks in this field and help in making new ones between Universities and professional societies and pave the way for new collaborations. Topics of interest to the Conference include:

A- Physics of space charge in non-conductive materials. Polymers, Composites, Ceramics, Glasses, Bio dielectrics and nanodielectrics, Meta-materials, Piezoelectric, Pyroelectric and Ferroelectric materials.

B- Dielectric properties, polarization phenomena, Charge storage and transport, High-field effects, Energy localisation and thermodynamics of charged insulators, Space charge characterization techniques, Aging, Partial discharges, Electrical breakdowns, Friction, Treeing, High-field effects.

C- Modeling and theory.

D- Measurement techniques.

E- Industrial and biomedical applications.

The Fourth International Meeting on Dielectric Materials (IMDM'4) follows three international meetings that were all organized in Tunisia:

- IMDM'1: Mahdia, Tunisia, 30 March- 01 April 2000,
- IMDM'2: Mahdia, Tunisia 24-26 January 2002
- IMDM'3: Monastir, Tunisia, 14-18 December 2011.

We would like to extend our sincere thanks to all the sponsors for their generous assistance especially ICTP, CNRST and Hassan II Academy. We are also very grateful to the organizing committee for their efforts without which this event would not have taken place.

The local organizing committee

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Académie Hassan II Sc. Tech.

Fourth International Meeting
On Dielectric Materials
Marrakech, Morocco, 29-31 May 2013

PROGRAM

Tuesday 28 May

16h 00-20h	Registration

Wednesday 29 May

08h 00 - 09h 00	Registration
09h 00 – 09h 30	Opening ceremony
09h 30 – 10h 15	**Conference 1 (CONF1)** **Keynote Speaker** BROSSEAU Christian *Université Européenne de Bretagne, Lab-STICC, Université de Brest, France* Engineering nanostructures with enhanced thermoplasmonic properties for biosensing and selective targeting applications
10h 15 – 11h 00	**Welcome reception**
11h 00 – 13h 30	**Oral sessions** **Session A1 :** (OA1, OA2, OA3, OA4, OA5, OA6, OA7, OA8, OA9,OA10)
11h 00 – 11h 15	OA1 Amina TACHAFINE *UDSMM, Université du Littoral-Cote d'Opale, France* Comportement ferroélectrique et relaxeur de céramiques BZT
11h 15 – 11h 30	OA2 Gamal TURKY *National Research Centre, Bohoos Str, Dokki, Cairo, Egypt* Dielectric Aspects of Hyperbranched Polymers
11h 30 – 11h 45	OA3 Asma TRIKI, *Laboratoire des Matériaux Composites, Polymères et Céramiques, FSS, Sfax, Tunisia* Dielectric and vibrational study of the unsaturated polyester composite reinforced with Alfa/Wool/thermo-binder fibers
11h 45 – 12h 00	OA4 Samira BOUMOUS *LEER Laboratory, Mohamed cherif Messaidia University Souk Ahras , Souk Ahras, Algeria* Space Charge Measurement in Dielectric Materials
12h 00 – 12h 15	OA5 Nacera ROUHA *LGEB, Université A. MIRA de Béjaia, Algeria* Diagnosis of the EPDM's electrical aging by partial discharge

	measurement and SEM analysis
12h 15 – 12h 30	OA6 El Mahdi ASSAID *Faculté des Sciences, Université Chouaïb Doukkali, El Jadida, Morocco* Double Dielectric Mismatch Effect on Exciton Ground State Energy in Spherical Core/Shell Nanostructures
12h 30 – 12h 45	OA7 Manar KHACHANE *Faculté des Sciences Semlalia, Université Cadi Ayyad Marrakech, Morocco* Catalytic behavior of RuO_2 films deposited on ferroelectrics films
12h 45 – 13h 00	OA8 Ahmed GUEDDIM *Materials Science and Informatics Laboratory, Faculty of Science, University of Djelfa, Algeria* Density Functional Study of structural and dielectric properties of $ZnTe_{1-x}O_x$
13h 00 – 13h 15	OA9 Mayssa KARRAY *Sciences Faculty of Sfax, Tunisia* Studies of dielectric relaxation in Flax fibers reinforced unsaturated epoxy
13h15 – 13h 30	OA10 Abdelhalim ELBASSET *LSSC, Département de Génie Electrique, FST Route d'Immouzzer, Fès. ,Morocco* Etude diélectrique de titanate de baryum pur et dopé
11h 00 – 13h 30	**Oral sessions** **Session B1:** (OB1, OB2, OB3, OB4, OB5, OB6, OB7, OB8, OB9, OB10)
11h 00 – 11h 15	OB1 A. BENOTSMANE *Université Abdelhamid Ibn Badis de Mostaganem, Algeria* Study of nonlinear optical phenomena in photonic crystals based on III-V semiconductors
11h 15 – 11h 30	OB2 Benamar BOUHAFS *Université Aboubek Belkaid-Tlemcen, Fac des Sciences Tlemcen, Algeria* Resonant Electromagnetic Field Distribution on Doped

	Multilayer Thin Film Structures
11h 30 – 11h 45	OB3 Cemre KUSOGLU SARIKAYA *Middle East Technical University, Department of Physics Ankara, Turkey* Investigation of the Paraelectric-Ferroelectric Phase Transition in Bulk and Confined Sodium Nitrite
11h 45 – 12h 00	OB4 Jean-Noël KOANE *University of Bangui Bangui,Central African Republic* Phytochimic and pharmacological studies of some Central African medicinal plants with antidiabetic properties
12h 00 – 12h 15	OB5 Mohamed CHITROUB *Département de Métallurgie, Ecole Nationale Polytechnique, Alger, Algérie* Thermoelectric properties of semi conducting compound $Sb_{71.22}Co_{2.97}Fe_{20.77}Ce_{5.04}$
12h 15 – 12h 30	OB6 Mohamed REMRAM *Laboratoire LEMEAMED, Université Mentouri Constantine Constantine, Algeria* Approche théorique des phénomènes d'absorption des nanotiges métalliques dans un milieu diélectrique sous l'influence d'une onde électromagnétique
12h 30 – 12h 45	OB7 Kamar EL AIDOUDI *Sciences Faculty of Kénitra, Morocco* Effect of the NiFe/Zr interface quality on the magnetoresistance in NiFe/Zr multilayer
12h 45 – 13h 00	OB8 Abdellah FERAOUN *Sciences Faculty of Meknès,Morocco* Monte Carlo study of a ferrimagnetic nanowire with core/shell morphology
13h 00 – 13h 15	OB9 Abderrahim RAIDOU *Sciences Faculty of Kénitra,Morocco* The influence of different parameters on the structural and optical characteristics of ZnO thin films

13h 15 – 13h 30	OB10 Ihsene Yasser TALEB *Faculty of Sciences, University of Tlemcen, Algeria* Study and optimization of a Photodiode containing nitride of elements III
13h 30-15h 30	**Lunch**
15h 30- 16h00	**Conference 2 (CONF2)** **Invited Speaker** BUKA Agnes *Institute for Solid State Physics and Optics, ,Wigner Research Centre of the Hungarian Academy of Sciences, Budapest, Hungary* Space charges and flexoelectricity in liquid crystals
16h 00- 16h30	**Conference 3 (CONF3)** **Invited Speaker** COSTA Luís Cadillon *Département de Physique, Université d'Aveiro, Aveiro, Portugal* Using impedance spectroscopy to understand materials
16h30 – 17h 00	**Conference 4 (CONF4)** **Invited Speaker** HAMRAOUI Ahmed *Service de Physique et Chimie des Surfaces et Interfaces CEA-SACLAY DSM/IRAMIS,Gif-sur-Yvette, France* Croissance axonale en relation avec les propriétés physico-chimiques du substrat d'adhérence : distribution spatiale de l'énergie de surface
17h00 – 17h30	**Coffee-break**
17h30 – 20h00	**Oral sessions** **Session A2 :** (OA11, OA12, OA13, OA14, OA15, OA16, OA17, OA18, OA19, OA20)
17h30-17h45	OA11 Ahmed GHONEIM *Microwave Physics and dielectrics Department, NRC, Cairo, Egypt* Dielectric properties of nanostructure Barium titanate / Cobalt ferrite composites
17h45-18h00	OA12 Mohamed GARGOURI *Sciences Faculty of Sfax, Tunisia* Electrical properties of $Cu_{1.8}Zn_{1.1}SnS_4$ for thin films photovoltaic applications: extraction of conduction

	mechanisms
18h00-18h15	OA13 Asmaa IBRAL *Sciences Faculty of El Jadida, Morocco* Double Dielectric Mismatch Effect on Exciton Ground State Energy in Spherical Core/Shell Nanostructures
18h15-18h30	OA14 Mohamed BEN AMOR *Sciences Faculty of Sfax, Tunisia* Dielectric characterization of thin TiO2 films
18h30-18h45	OA15 Arbi FATTOUM *Sciences Faculty of Gafsa, Tunisia* Thermal, structural and dielectric study of various polyvinyle alcohol/ammonium salt composites
18h45-19h00	OA16 Farid EL-TANTAWY *Faculty of Science, Suez Canal University, Ismailia, Egypt* New Nanoconducting Phantom Composite from Polyvinyl Chloride Reinforced Graphite/Nickel for Microwave Medical Imaging Applications
19h00-19h15	OA17 Amel MOHAMED BEN ALI *University El-Hadaeik, Skikda, Algeria* Physical and dielectric properties of Bio-waste reinforced poly (vinyl chloride) composites
19h15-19h30	OA18 N. BENREKAA, *University of Sciences and Technologies USTHB, Algiers,Algeria* Dielectric relaxation kinetics at higher temperature mode in cellulose
19h30-19h45	OA19 Mohsen MHADHBI *INRAP, Technopol of Sidi Thabet, Sidi Thabet, Tunisia* Magnetic properties of FeAl powders produced by mechanical alloying
19h45-20h00	OA20 El Fatmi DAOUDI *Sciences Faculty of Agadir, Morocco* Electric and Magnetic Properties In Composites Of Polymer Ar Multiwall Carbon Nanotubes

17h30 – 20h00	**Oral sessions** **Session B2** : (OB11, OB12, OB13, OB14, OB15, OB16, OB17, OB18, OB19, OB20)
17h30-17h45	OB11 Nadia NEBBACHE *University of Biskra, Algeria* Etude théorique de la structure et des propriétés électroniques des clusters de type M6 L14 (M= Mo, Fe, Co, Pd)
17h45-18h00	OB12 Slim FAKHFAKH *Sciences Faculty of Sfax, Tunisia* Défaillance de l'Approche Conventionnelle Nouvelles procédures pour la détermination de la deuxième énergie critique E2C sous irradiation permanente
18h00-18h15	OB13 Amor DJEMEL *Constantine I University, Constantine, Algeria* Temperature dependaence of lead salts infrared detection capabilities
18h15-18h30	OB14 Mourad AROUS *Sciences Faculty of Sfax, Tunisia* Characterization of phosphoric acid-based geopolymers synthesized at different ages and treated at different temperatures
18h30-18h45	OB15 Aida BENCHAABANE *Faculty of Sciences Tunis, El-Manar I, Tunis, Tunisia* Nanocomposite materials based on polymers and inorganic nanoparticles for photovoltaic application
18h45-19h00	OB16 Abderrahim ELBIYAALI *Faculty of Sciences of Meknès, Morocco* Infrared spectrum of single -walled boron carbide BC3 nanotube
19h00-19h15	OB17 Abdessitir DERAOUI *Université Catholique de Louvain, Belgium* Optical properties of nanostructured bioinspired materials
19h15-19h30	OB18 Mobarek DIB *Sciences Faculty of Kénitra, Morocco*

	Study of the Ferromagnetic resonance in thin films of permalloy nanoparticles diluted in an insulating matri Alumina
19h30-19h45	OB19 Mustapha BGHOUR *Sciences Faculty of Agadir, Morocco* Votex phase transitions and shot noise in YBCO HTc superconductors
19h45-20h00	OB20 Mohammed HAMZAH *Sciences Faculty Dhar EL Mahraz Fez, Morocco* Attenuated total reflection infrared and XPS spectroscopy analysis of the natural ageing of polyethylene samples

Thursday 30 May

08h 30 – 09h 00	**Conference 5 (CONF5)** **Invited Speaker :** WINTERSGILL Mary *Physics Department, U. S. Naval Academy Annapolis, MD 21402, USA* Dielectric Properties of Poly(ether imide) and Polycarbonate Containing Barium Titanate Nanoparticles
09h 00 – 09h 30	**Conference 6 (CONF6)** **Invited Speaker** : FORRO Làszló *(Laboratory of Physics of Complex Matter, Ecole Polytechnique Fédérale de Lausanne Switzerland)* Application of TiO_2-based composites
09h 30 – 10h 00	**Conference 7 (CONF7)** **Invited Speaker :** SAHRAOUI Bouchta *CNRS UMR 6200, Laboratoire MOLTECH-Anjou, Université d'Angers, France* TTF Based Electractive Ligands and their Metal Complexes for Optoelectronics, applications: NLO Investigations
10h 00 – 11h 00	**Poster session & Coffee-break** **Session 1: Poster:** PA1, PA2, PA3,……PAn
11h 00 – 13h 30	**Oral sessions** **Session A3 :** (OA21, OA22, OA23, OA24, OA25, OA26, OA27, OA28, OA29, OA30)
11h 00 – 11h 15	OA21

	Olawale OLATINSU *Faculty of Science, University of Lagos, Akoka Lagos, Nigeria* Frequency Dependent dielectric responses of Rock Types from Ewekoro Cement Quarry, Southwest Nigeria
11h 15 – 11h 30	OA22 Tamara PETKOVA *Institute of Electrochemistry and Eenergy Systems, Bulgarian Academy of Sciences, Acad.G.Bonchev, Sofia, Bulgaria* Electrical transport in dielectric Ge-Se-In thin films
11h 30 – 11h 45	OA23 Maria ZDANOWSKA-FRĄCZEK *Institute of Molecular Physics, Polish Academy of Sciences, Poznań, Poland* Molecular Dynamics and Electric Conductivity Process Efficiency in Selected Proton Conductor
11h 45 – 12h 00	OA24 Asma ZOUITINE *ENSET, Mohamed V Souissi University, Rabat, Morocco* Effect Of Double Dielectric Mismatch On Electron And Hole Energies In Spherical Core/Shell Nanostructures
12h 00 – 12h 15	OA25 Khadidja RAHMOUN *Sciences Faculty University of Tlemcen,Algeria* Effective dielectric constant of porous silicon low dielectric constant thin films
12h 15 – 12h 30	OA26 Lamiae MRHARRAB *Sciences Faculty Dhar El Mahraz, Fés, Morocco* CHARACTERIZATION OF CERAMIC DIELECTRIC Pb(Zrx,Ti1-x)O3
12h 30 – 12h 45	OA27 Karim CHOURTI *Faculté Pluridisciplinaire de Nador, Morocco* Study of the structural evolution and the dielectric properties in the $Ba_4(Nd_{1-x}Sm_x)_{9.33}(Ti_{0.95}Zr_{0.05})_{18}O_{54}$ solid solution
12h 45 – 13h 00	OA28 Mohamed ELHASNAOUI *Sciences Faculty of Kénitra, Morocco* Effect of conductive particles on electrical conductivity of copolymer matrix

13h 00 – 13h 15	OA29 Abdelhadi El Bachiri *Sciences Faculty of Kénitra, Morocco* Etude de la conductivité statique (dc) des niobates de lithium (LiNbO3)
13h 15 – 13h 30	OA30 Adil HADRI *Sciences Faculty, Mohamed V Souissi University Rabat, Morocco* Effect of indium doping on structural, optical and electrical properties of sprayed-ZnO thin films
11h 00 – 13h 30	**Oral sessions** **Session B3 :** (OB21, OB22, OB23, OB24, OB25, OB26, OB27, OB28, OB29, OB30)
11h 00 – 11h 15	OB21 Rabah BELOUADAH *M'sila University, Algeria* Magnetoelectric phenomena in trilayered composites: experiments and modeling
11h 15 – 11h 30	OB22 Jacques ATANGANA *University of Yaoundé I, Yaoundé, Cameroon* Effective stabilization of temporal and spectral profiles of soliton light pulse, strongly distorted by higher order effects in optical fiber systems
11h 30 – 11h 45	OB23 Takwa EL BEKRI *Electrical department Tunisian national school of engineers Tunis, Tunis, Tunisia* Experimental study of opening arcs in the air of AgNi contacts
11h 45 – 12h 00	OB24 Ali MOUSA *Department of Applied Sciences, University of Technology, Baghdad, Iraq* An Investigation of the Electronic Properties of Cadmium Telluride using Space Charged Limited Current
12h 00 – 12h 15	OB25 Abdulati ELALEM *Faculty of Engineering University of Tripoli, Libya* Melt Flow of Ceramic Composite Materials
12h 15 – 12h 30	OB26

	Kamel SAID *Sciences Faculty of Sfax, Tunisia* Identification in Alumina of the Intrinsic Properties Governing the Charging Process Under Electron Irradiation
12h 30 – 12h 45	OB27 Jaafar Othman ZAYANI *Sciences Faculty of Sfax, Tunisia* Structural and Cathodoluminescence properties of Znx−1MgxO ceramics
12h 45 – 13h 00	OB28 Ouafae NINIS *LIMAO, Faculté Polydisciplinaire, Taza, Morocco* Optoelectronic and electrochemical properties of a new π-conjugated compound based on pyrrole
13h 00 – 13h 15	OB29 Lamiae TALHA *Sciences Faculty Dhar EL Mahraz Fez, Morocco* Effect of charge polydispersity in the dynamics of a micellar system
13h 15 – 13h 30	OB30 Omar REJAIBA *Sciences Faculty of Sfax, Tunisia* Effects of substrate resistance and interfacial traps on the electric properties of Al/SiO_2/Si structure
13h 30 – 15h 00	**Lunch**
Afternoon	**Social Program** The Thursday afternoon will be devoted to visit of Marrakech
21h	**Gala Dinner**

Friday 31 May

08h 30 – 09h 00	**Conference 8 (CONF8)** **Invited Speaker :** PISSIS Polycarpos *National Technical University of Athens, Physics Department, Zografou Campus,* *Iroon Polytechneiou 9, Zografou Campus,Athens, Greece* Space Charge and Interfacial Polarization in Polymer Nanocomposites
09h 00 – 09h 30	**Conference 9 (CONF9)** **Invited Speaker :** ABOU-DAKKA Mahmoud

	(IEEE CEIDP 2012-2013 Conference ChairSenior Research Officer *National Research Council of Canada Ottawa, Canada* Diagnostic Technique for Smart Maintenance of Medium Voltage Power Cables Based on Depolarization Principle
09h 30 – 10h 30	**Poster session & Coffee-break** **Session 2: Posters** : PB1, PB2, PB3,……PBn
10h 30 – 12h 30	**Session A4 :** (OA31, OA32, OA33, OA34, OA35, OA36, OA37, OA38, OA39)
10h 30 – 10h 45	OA31 Lucian PINTILIE *National Institute of Materials Physics, Atomistilor, Romania* Effect of the electrode interface on the dielectric properties of the epitaxial ferroelectric thin films
10h 45 – 11h 00	OA32 Imed BOUKHRIS *Sciences Faculty of Sfax,Tunisia* Modelling of bipolar charge transport in polyethylene macro and nano-scales under dc applied voltage
11h 00 – 11h 15	OA33 Mohamed KHARROUBI *University of Djelfa, Algeria* Étude du Phénomène de Relaxation Diélectrique dans un Verre Diphosphate $Na_2ZnP_2O_7$ Dopé par le Co^{2+}
11h 15 – 11h 30	OA34 Hassiba MOUALKIA *University of Larbi Ben M'Hidi,* *Oum El Bouaghi, Algeria* Characterization of CdS Thin Films Grown by Chemical Bath Deposition Using Two Different Cadmium Salts
11h 30 – 11h 45	OA35 Hocine KADI *University of Tizi Ouzou,Algeria* Influences de l'effet couronne sur les surtensions dans les lignes et postes électriques de tension nominale de
11h 45– 12h 00	OA36 Radouane SELLAK *UMR CNRS 6283, Université du Maine, Le Mans, France* Preparation of new conductive thermosetting composites using low contents of particles
12h 00– 12h 15	OA37 Mohamed AFQIR

	Sciences Faculty Semlalia of Marrakech, Morocco Élaboration et caractérisation des matériaux ferroélectriques dérivant du Banana
12h 15– 12h 30	OA38 Abdeslem BELDJILALI *University of Sciences and Technology of Algiers, Algeria* Isothermal Charging Currents on Insulting Liquids for Power Transformers Diagnosis
12h 30– 12h 45	OA39 Jilali BELATTAR *Sciences Faculty of Kénitra, Morocco* A comparison between the permittivity and electric modulus representations of the microwave response of composites under uniaxial tension
10h 30 – 12h 30	**Session B4 :** (OB31, OB32, OB33, OB34, OB35, OB36, OB37, OB38, OB39)
10h 30 – 10h 45	OB31 Basma ASKRI *Sciences Faculty of Tunis, Tunisia* Caractérisation à l'aide de la simulation Monte Carlo de l'évolution temporelle de la charge piégée dans une cible de quartz soumise à une irradiation électronique
10h 45 – 11h 00	OB32 Ali EYADEH *Al-Jouf University, Sakaka, Saudi Arabia* FECG Extraction Using LMS-based Adaptive Noise Canceling Approach
11h 00 – 11h 15	OB33 Abdellah BENAMI *FSTE, Moulay Ismail University, Meknès, Morocco* L'effet des nanoparticules métalliques d'argent intégrées sur la photoluminescence des nanocristaux de silicium
11h 15 – 11h 30	OB34 Fathi JOMNI *Faculty of Sciences Tunis, Tunisia* Etude de l'hydrophobicité du parylène par la mesure de l'angle de contact
11h 30 – 11h 45	OB35 Hassan KIROU *Sciences Faculty of Agadir, Morocco* Cu_2ZnSnS_4 thin films deposited by electrochemical technique for Photovoltaic solar energy

11h 45– 12h 00	OB36 Fatima FERGANI *Moulay Ismail University, Meknès, Morocco* Polyiodides Intercaling effects on Raman spectra of single-walled carbon nanotubes
12h 00– 12h 15	OB37 Lakhdar BESSISSA *Djelfa University, Djelfa, Algeria* Exploitation of several artificial intelligence techniques in modeling the XLPE HV cables insulation properties subjected to thermal aging
12h 15– 12h 30	OB38 H. RAHMOUNI *Faculté des Sciences de Gabès, Tunisia* Electrical properties of $Pr_{0.6}7Ba_{0.33}MnO_3$ doped with iron
13h 00 – 16h 00	**Lunch**
16h 00 – 16h 30	**Conference 10 (CONF10)** **Invited Speaker** : FONTANELLA John *Physics Department, U. S. Naval Academy Annapolis, USA* Improved Capacitor Materials Based on Dipolar Modifications of Polycarbonate
16h 30 – 17h 00	**Conference 11 (CONF11)** **Invited Speaker :** ÉBER Nándor *Institute for Solid State Physics and Optics Wigner Researh Centre for Physics Hungarian Academy of Sciences Budapest, Hungary* Electric Field Induced Alternating Patterns at Ultra-low Frequency Driving in Nematic Liquid Crystals
17h 00 – 17h 30	**Conference 12 (CONF12)** **Invited Speaker** : REMIENS Denis *EMN – DOAE - UMR CNRS 8520, Université de Valenciennes et du Hainaut, Valenciennes, France* Ferroelectric thin films working at microwave frequency for reconfigurable devices: performances comparison of BST, PST
17h 30 – 19h00	**Closing ceremony**

Saturday 1 June

Excursions

Keynote and Invited Presentations

CONF01

Engineering nanostructures with enhanced thermoplasmonic properties for biosensing and selective targeting applications

Christian BROSSEAU

Université Européenne de Bretagne, Université de Brest, Lab-STICC, CS 93837, 6 avenue Le Gorgeu, 29238 Brest Cedex 3, France.

brosseau@univ-brest.fr

This work connects the study of thermoplasmonic properties in nanoscale particles with areas of biophysics involving cell membrane with or without conductive pores. Using a quasistatic finite element modeling of the heat transfer equation in three dimensions we simulate the stationary heat generation and temperature field around several types of gold-based nanostructures. Models were constructed that emphasized the importance of obtaining precise emperature fields that might subsequently be used for biosensing and selective targeting applications. By analyzing the observed temperature increase, effective complex permittivity, and electric field enhancement that result from plasmonic resonance, this theoretical framework provides new insight into the role of the nanoparticle shape in heat generation. To llustrate the usefulness of this approach for biosensing applications, we consider how the positioning of the nanoantenna affects heating efficiency. Linear response calculations of the emperature increase reveal that symmetric gold nanosphere dimers are not only suitable for sensing applications, but can also play the role of heat sources which are more efficient than he case of a single nanosphere. We also predict that this specific type of nanoantenna allows us to detect the presence and size of a hole in the cell membrane. These results provide insight into the physics of cell membrane and provide guidance for more detailed studies of nanoscale control of temperature in biological materials.

Keywords: *Plasmonic, Nanoantenna, Biosensor, Numerical simulation*

CONF02
Space charges and flexoelectricity in liquid crystals

Agnes BUKA
Institute for Solid State Physics and Optics, Wigner Research Centre of the Hungarian Academy
of Sciences,H-1121 Budapest, Hungary
buka.agnes@wigner.mta.hu

Pure liquid crystals are ideally electrically insulating materials but being organic fluids, the real samples have a finite conductivity due to ionic impurities. Like all other physical properties their electric impedance components (dielectric permittivity and conductivity) are anisotropic quantities. Moreover the molecular polarity and shape anisotropy give rise to a coupling between mechanic deformation and electric polarization; a phenomenon called flexoelectricity [1]. Due to these properties, liquid crystals respond spectacularly to applied electric fields, give rise to space charge formation that usually results in regular or chaotic flow patterns in space and time. The periodic structures often undergo several morphological transitions as a function of voltage, frequency, temperature or other relevant control parameters. The theoretical background of these phenomena as well as a few, demonstrative experimental results will be presented.

Keywords: Liquid crystals in electric field, pattern formation

References:

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CONF03
Using impedance spectroscopy to understand materials

LUÍS CADILLON COSTA
I3N and Physics Department, University of Aveiro, 3810-193 Aveiro, Portugal
kady@ua.pt

Impedance spectroscopy allow us to understand the polarization mechanisms present in materials, that is, the charge migration and that one due to the orientation of permanent dipoles. The different regimes of the dielectric function can be observed and the dynamics of the relaxations can be found. In fact, to obtain a complete characterization, a large range of frequencies and temperatures must be used. In this work, different examples of using impedance

spectroscopy to characterize materials are presented, showing the capability of this technique. It presents good performances that permit to investigate the fundamental aspects of the electrical properties, yielding a wealth of information about the molecular motions and relaxation processes. In the case of polymers, the technique is particularly useful to study the material, and frequently complemented by other measurement methods. The presence of fillers, such as carbon nanotubes, conducting particles of carbon black or polypyrrole, can be detected clearly using impedance spectroscopy.

Keywords: *Impedance spectroscopy, dielectric response, carbon nanotubes*

CONF04
Croissance axonale en relation avec les propriétés physico-chimiques du substrat d'adhérence : distribution spatiale de l'énergie de surface

Ahmed HAMRAOUI

CEA-SACLAY DSM/IRAMIS/ Service de Physique et Chimie des Surfaces et Interfaces, Bâtiment 462,

91191 Gif-sur-Yvette, France

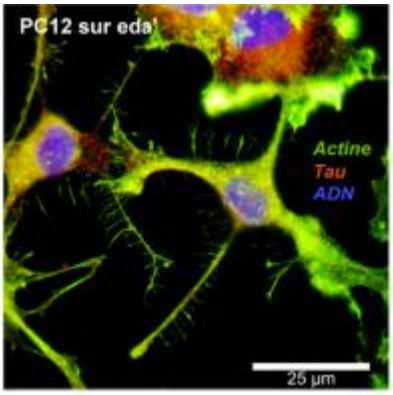
ahmed.hamraoui@cea.fr

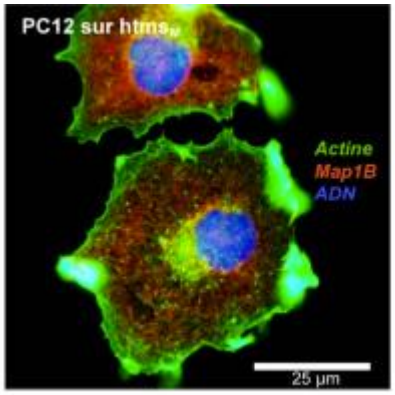
La croissance des neurites est un processus important dans la formation des réseaux de neurones. Quand le Système Nerveux Central (SNC) (cerveau + moelle épinière) mature subit des lésions, il se produit des déficits fonctionnels irréversibles et durables suite à l'incapacité des cellules à rétablir des connexions. Ces lésions peuvent avoir plusieurs origines: accidentelles, congénitales ou tumorales. Après une lésion dans le système nerveux périphérique, l'axone se régénère et vient ré-innerver les mêmes fibres musculaires. Par contre, dans le SNC adulte, la régénérescence axonale est fortement inhibée par le système nerveux lui même. Les mécanismes élémentaires de la croissance d'un axone de neurones soumis à une influence locale telle que le gradient dans l'énergie d'adhésion restent encore mal compris. Il y a donc un réel besoin de compréhension des mécanismes élémentaires de la croissance axonale. Dans cet exposé, nous présenterons les résultats obtenus lors de l'étude de la croissance d'un axone de neurones modèles soumis à une distribution spatiale et locale de l'énergie d'adhésion. Dans ce travail nous avons démontré que les

hétérogénéités chimiques de surface exercent une influence critique sur les processus de régénérescence des cellules nerveuses. L'identification des paramètres stimulant cette croissance constituerait une avancée majeure dans la maitrise des processus de réparation du nerf qui profitera aux traitements de maladies neurodégénératives.

Axonal growth in connection with the physico-chemical properties of thesubstrate adhesion: spatial distribution of surface energy

Neurite outgrowth is an important process in the formation of neural networks. When the Central Nervous System (CNS) (brain + spinal cord) mature is injured, there is irreversible functional deficits and durable due to the inability of cells to restore connections. These lesions can have several causes: accidental defects or tumor. After an injury in the peripheral nervous system, axon regenerates and is re-innervate the same muscle fibers. On the other hand, in the CNS, axonal regeneration is strongly inhibited by the nervous system itself. The basic mechanisms of axon growth of neurons subject to local influence as the gradient in the energy of adhesion remains poorly understood. There is therefore a real need to understand the basic mechanisms of axonal growth. In this talk we will present results obtained from the study of axonal growth of neurons under the influence of a spatial distribution and local of energy of adhesion. In this work we demonstrated that the surface chemical heterogeneities exert a critical influence on the process of axonal regeneration in nerve cells. The identification of parameters stimulating this growth would be a major advance in the mastery of nerve repair process that will benefit in the treatment of neurodegenerative disease.





CONF05

Dielectric Properties of Poly(ether imide) and Polycarbonate Containing Barium Titanate Nanoparticles

Joseph F. LOMAX[1], John J. FONTANELLA[2], Mason A. WOLAK[3], Mary C. WINTERSGILL[2], Charles A. EDMONDSON[2], Mark A. WESTGATE[2]

[1]*U. S. Naval Academy, Chemistry Department, Annapolis, MD, 21402, USA*
lomax@usna.ediu

[2]*U. S. Naval Academy, Physics Department, Annapolis, MD, 21402, USA*
fontanel@comcast.net, mwinter@usna.edu

[3]*U. S. Naval Resesearch Laboratory, Washington, DC, 20375, USA*
mason.wolak@nrl.navy.mil

One approach to increasing capacitive energy storage is to study dielectrics composed of nanoparticles in a polymer matrix.[1] Recently, several of the authors have presented results for nanodielectrics composed of poly(ether imide) (PEI) and nano-sized $BaTiO_3$.[2] This includes dielectric breakdown and audio frequency relative permittivity and loss studies for a wide range of nanoparticle concentrations. The measurements were carried out from 5.5K to 400K. The room temperature relative permittivity vs. nanoparticle content follows a recently proposed modified Hanai equation. A relaxation in the region of 20K was found and shown to be associated with the $BaTiO_3$ nanoparticles, themselves. In addition, a water-associated relaxation is found in the vicinity of 200K. Finally, the dielectric breakdown strength was found to decrease as the nanoparticle content increases. Microstructure-level simulations

showed that matrix field intensification cannot account for all of the variation of breakdown strength with nanoparticle concentration. Detailed studies have also been reported for $BaTiO_3$ nanoparticles in a cavity.[3] In that case, the shape and intensity of the low temperature relaxation exhibited size effects. In the present paper, results for $BaTiO_3$ nanoparticles in polycarbonate are discussed and compared with those for nanoparticles in PEI.

***Keywords**: Nanocomposites, $BaTiO_3$ Nanoparticles, Polycarbonate, Dielectric Properties*

References:

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*3. J. F. Lomax, J. J. Fontanella, C. A. Edmondson, M. C. Wintersgill, M. A. Westgate, S. Eker, J. Phys. Chem. C, 2012, **116 (44)**, 23742-23748.*

CONF06

Application of TiO_2-based composites

LÁSZLÓ FORRÓ
Laboratory of Physics of Complex Matter
Ecole Polytechnique Fédérale de Lausanne
CH-1015 Lausanne, Switzerland
laszlo.forro@epfl.ch

We can synthesize the anatase phase of TiO_2 at different length scales: bulk single crystals, single crystalline nanotubes/ nanowires and nanoparticles. These forms of anatase offer the possibilities for fundamental research, applications in photovoltaics, spintronics and in biophysical studies. This presentation will focus on the synthesis and application of single crystalline anatase nanowires. Our method, beyond the high structural quality, allows the doping and manipulation of nanowires in order to have active nano-sized materials. A broad range of applications, from photovoltaics to bioengineering will be illustrated. For example, nanowires were fused into a 3D fibrous network. It was used in a photovoltaic cell with solid electrolyte. This architecture possesses a high roughness factor, significant light scattering and up to several orders of magnitude faster electron

transport which plays an important role in a high conversion efficiency.

Acknowledgment: *The contributions of Endre Horvath, Arnaud Magrez,Lenke Horvath, Jacim Jacimovic and Michael Graetzel are gratefully acknowledged.*

CONF07

TTF Based Electractive Ligands and their Metal Complexes for Optoelectronics applications: NLO Investigations

Bouchta SAHRAOUI[1,*], Konstantinos ILIOPOULOS[1,2] and **Abdelkrim EL-GHAYOURY[1]**

[1]LUNAM Université, Université d'Angers, CNRS UMR 6200, Laboratoire MOLTECH-Anjou,
2 bd Lavoisier, 49045 ANGERS cedex, France
[2]Institute of Chemical Engineering Sciences, Foundation for Research and Technology Hellas (FORTH/ICE-HT),26504 Patras, Greece
(*) corresponding author: Bouchta SAHRAOUI, ***bouchta.Sahraoui@univ-angers.fr***

Nonlinear optical phenomena play a key role in several useful photonic applications. Nonlinear optical (NLO) Material such as: electractive TTF derivatives and their corresponding electroactive metal complexes, due to their electronic properties, have been found to have original and interesting NLO properties which could lead to many applications like Optical limiting, frequency conversion, image processing, data storage, fiber optic communication… We report in this work, diagnostic of NLO properties of TTF based electractive ligands and of their electroactive metal complexes for Optoelectronics applications. We will describe briefly the context and the used technical experimental setup for the investigation of NLO properties of third order. A comparison between NLO properties of the TTF derivatives, free TTF based ligands and their corresponding metal complexes show an increase of the NLO response and also, in the case of, iron and ruthenium metal complexes a switch of the response from the RSA to SA behaviour[1-2]. The possibility to modify the nonlinear optical response by complexation with metal cation and/or by the use of different counter ions that affects the structural arrangement of the materials open new prospects for their use in photonic applications. Moreover *ab-initio* quantum mechanical

calculations will be given in order to make comparison between experimental and theoretical results.

Keywords: *Molecular Photonics, Nonlinear Optics, Optical limiting, Organic Compounds*

Acknowledgements: *K.I. acknowledges support from the European Commission and General Secretariat for Research and Technology (Greece) for a National Strategic Reference Framework (NSRF) project (PE3-(1612)). The authors would like to thank B. Derkowska, A. Ranganathan, P. Batail, D. Gindre, A. Karakas, A. Migalska-Zalas for their helpful discussions*

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CONF08
Space Charge and Interfacial Polarization in Polymer Nanocomposites

Polycarpos PISSIS

National Technical University of Athens, Department of Physics, Herroon Polytechneiou 9, Zografou Campous,Athens, 15780, Greece

ppissis@cental.ntua.gr

Dielectric techniques, in particular broadband dielectric relaxation spectroscopy (DRS) and thermally stimulated depolarization currents (TSDC) techniques, covering together broad ranges of frequency and temperature, have been employed to study space charge and interfacial polarization in polymer nanocomposites. A variety of nanocomposites have been investigated, based on thermplastcs and rubbers as matrices, and silica, titania, carbon nanotubes (CNT) and silver nanoparticles as fillers. Differential scanning calorimetry (DSC) studies on the same samples provided quantitative information on thermal transitions (glass transition, crystallization/melting) of the polymer matrix, evaluated in terms of polymer-filler interactions and correlated to the results of dielectric studies. The morphology of the samples, in particular the quality of filler dispersion, was studied by electron microscopy (SEM and TEM), providing quantitative information which was used in the analysis and the discussion of the

dielectric data. A pronounced Maxwll-Wagner-Sillars (MWS) interfacial polarization/relaxation was observed in rubber/silica and rubbrt/titania nanocomposites and analyzed in terms of filler aggregation. At high filler contents (core-shell type nanocomposites) internal field effects become significant, giving rise to high values of dielectric permittivity. In the case of conductive fillers (CNT, metal particles) this occurs already at low filler fractions, below the percolation threshold. The frequency and temperature stability of the enhanced permittivity values was studied in detail, envisaging applications asnanodielectrics.

***Keywords**: polymer nanocomposites, nanodielectrics, interfacial polarization, percolation threshold*

CONF09

Diagnostic Technique for Smart Maintenance of Medium Voltage Power Cables Based on Depolarization Principle

Mahmoud ABOU-DAKKA[1], Douglas MCINTYRE[1]

[1]*1200Montreal Road, Ottawa, Ontario, K1A 0R6, Canada*

mahmoud.abou-dakka@nrc-cnrc.gc.ca

Ingress of moisture and impurities is normally driven from the soil into the volume of power cable insulations by the electric field. Due to this effect, the breakdown strength of these insulations can be substantially reduced.

It is well known that not every old and unjacketed power cable is at risk of unexpected failure where many cables are still in good condition in spite of being in service for many years [1]. Any premature replacement of cables may cause the loss of many years of service, i.e. financial losses to utilities; otherwise, uncontrolled power outages will cause client dissatisfaction. Therefore, it is crucial to develop a "smart cable replacement strategy", only replacing those cables that could adversely affect the reliability of a network in the near future. The implementation of such a strategy can only be accomplished if a utility has access to reliable and non-destructive diagnostic tools that can be applied in-field.

At the National Research Council of Canada (NRC) a non-destructive technique based on the dc polarization/depolarization current measurements was recently developed. It was proven that the most

consistent Diagnostic Indicator (DI) was the area under the high frequency (HF) components of the polarization or the depolarization current of measured cable relative to the virgin cable. The actual conditions of the on-site tested cables can be divided into three categories: Good Condition, Fair Condition, and Poor Condition [2].
In this work, first, the results of the last project of cable measurements performed in-field using our technique on the local utility company's network will be presented. In addition, a continuing project is launched to link the DI to the length and concentration of water trees in the insulation. To realize that goal, two types of specimens were used: (i) flat specimens of XLPE and TR-XLPE were aged in a wet environment to simulate cable, (ii) a field-aged cable, which failed after a certain time of being measured by our technique. The length and concentration of water trees and dielectric losses were linked to the depolarization parameters. The cables removed from field demonstrated the impact of defects due to manufacturing process, and local damage on accelerating local failures. These measurements will help in accumulating the data necessary to establish the cable condition criteria using our technique, which would be a large step forward towards the development of a smart maintenance strategy for medium voltage power cables [3].

***Keywords**: Diagnostic, Polarization/Depolarization, cable maintenance strategy*

References:

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CONF10

Improved Capacitor Materials Based on Dipolar Modifications of Polycarbonate

JOHN T. BENDLER[1], JOHN J. FONTANELLA[2], CHARLES A. EDMONDSON[2], MARY C. WINTERSGILL[2], DAVID A. BOYLES[3], TSVETANKA S. FILIPOVA[3]

[1]*BSC, Inc., 3046 Player Drive, Rapid City, SD, 57702, USA*
john.bendler@gmail.com
[2]*U. S. Naval Academy, Physics Department, Annapolis, MD, 21402, USA*
fontanel@comcast.net, mwinter@usna.edu, edmond@usna.edu
[3]*South Dakota School of Mines and Technology, Rapid City, SD, 57701, USA*
David.Boyles@sdsmt.edu, Tsvetanka.Filipova@sdsmt.edu

Bisphenol A polycarbonate (BPA-PC) was used in high quality capacitors for many years. One of the drawbacks of the use of BPA-PC is the small value of about 3 for the real part of the relative permittivity, ε'. One approach that has been taken recently to increase ε' is to make structural/chemical modifications in order to add dipoles to BPA-PC. For example, several of the authors have recently reported results for a fluorine-substituted, polycarbonate-based material, fluorinated tetraaryl bisphenol A polycarbonate (DiF p-TABPA-PC).[1] However, the increase in ε' at room temperature relative to BPA-PC was only about 10% though the breakdown strength remained quite high. In addition, the low temperature process loss maximum shifted to higher temperature and this is undesirable because it leads to greater dielectric loss in the polymer at room temperature. Most recently, a cyanoethyl group has been substituted for one of the geminal dimethyl groups in BPA-PC.[2] The new material (CN-PC) exhibits a much larger increase in ε' though the breakdown strength is decreased. However, the dielectric loss remains low at room temperature. Both experimental dielectric data and the results of computer modelling will be discussed.

Keywords*: Dielectric Permittivity, Dielectric Breakdown, fluorinated polycarbonate, cyano-substituted polycarbonate*

References:

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CONF11
Electric Field Induced Alternating Patterns at Ultra-low Frequency Driving in Nematic Liquid Crystals

Nándor ÉBER[1], Péter SALAMON[1], Alexei KREKHOV[2], Ágnes BUKA[1]
[1]*Institute for Solid State Physics and Optics, Wigner Research Centre for Physics, Hungarian Academy of Sciences, H-1525 Budapest, P. O. Box 49,Hungary*
eber.nandor@wigner.mta.hu **,** ***salamon.peter@wigner.mta.hu*** **,** ***buka.agnes@wigner.mta.hu***
[2] *Institute of Physics, University of Bayreuth, D-95440 Bayreuth, Germany*
alexei.krekhov@uni-bayreuth.de

Nematic liquid crystals (NLCs) are fluids with a uniaxial orientational order (characterized by a director) and anisotropic dielectric properties. Applying an audio frequency sinusoidal voltage to a thin layer of NLC may induce either homogeneous reorientation utilizable in display devices or spatio-temporal patterns where director modulations are mostly accompanied to space charge separation and material flow (electroconvection, EC). Here we report on patterns excited by ultra-low frequency ($f < 1$ Hz) ac voltages, where the relaxation time of the NLC cell is much shorter than the period time T of driving. Under such conditions a pattern becomes flashing, i.e. can emerge and decay within T/2. Measurements on planar cells of two NLC compounds by polarizing microscopy as well as by laser diffraction have shown that for frequencies below 50 mHz an alternation of two distinct pattern morphologies are detectable within each half period [2] . First, electroconvection develops in the form of oblique rolls (stripes running at an angle to the initial director) following the polarity reversal of the applied voltage. Following its decay, convection free equilibrium periodic deformation, flexoelectric domains[1] (stripes parallel to the director), emerges that also decays before the end of the half period. Thus the two pattern morphologies are well separated both in time and in the Fourier space. Comparison of the measured data with a recent theoretical description[3] showed good qualitative agreement. Simultaneous electric current measurements have, however, indicated a nonlinear current response to the applied voltage: a current peak at each polarity reversal. There

seems to be a phase matching correlation between this current peak and the emergence of the EC pattern, emphasizing the role of ionic processes, not yet included into the theory.

Keywords: *Liquid crystals, Electroconvection, Flexoelectricity, Patterns*

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CONF12

Ferroelectric thin films working at microwave frequency for reconfigurable devices: performances comparison of BST, PST.

Denis RÉMIENS, Freddy PONCHEl, Areski GHALEM, Tuami LASRI.
IEMN – DOAE - UMR CNRS 8520
Université de Valenciennes et du Hainaut Cambrésis – Le Mont Houy
59313 – Valenciennes Cedex 9, France
denis.remiens@univ-valenciennes.fr

$Ba(Sr,Ti)O_3$ (BST) and Pb(Sr,Ti)O3 (PST) compounds have become one of the leading materials for the development of microwave components such as decoupling capacitors and tunable devices, including reconfigurable mixers, delay lines, filters, and phase shifters,[1-3]. The main reasons for this interest are linked to their high dielectric response and possibilities of tunability offered, even at very high frequencies, near the ferroelectric phase transition temperature. In this talk we compare the most important properties: permittivity, loss factor and tunability of BST and PST films deposited on different substrates by radio frequency magnetron sputtering. Extraction of all the parameters of interest requires, for the analysis of the dielectric properties, the establishment of a specific structure with particular slot width, a coplanar waveguide (CPW) with a small distance between conductors is used. Additionally, this configuration provides the opportunity for measuring the S-parameters of the structure which will be considered as input data for the full-wave element analysis[4]. All the measurements have been performed, in room temperature, utilizing an

Agilent E8361A PNA microwave network analyzer coupled to a Cascade Microtech ground-signal-ground probe station. We will show clearly the PST material has some advantage in comparison to BST for microwave device applications in particular the tunability and the growth temperature compatible with silicon substrate for monolithic integration.

***Keywords**: Ferroelectric films, electrical properties, microwave frequency, reconfigurable devices, silicon integration*

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Oral Presentations

OA1

Comportement ferroélectrique et relaxeur de céramiques BZT

A. TACHAFINE[a], A. AOUJGAL[a,b], M. RGUITI[c], M.P.F. GRAÇA[d], L.C. COSTA[d], A. OUTZOURHIT[b],J.-C. CARRU[a]

[a] Unité de Dynamique et Structure des Matériaux Moléculaires, Université du Littoral - Côte d'Opale, 50 rue Ferdinand Buisson, B.P. 717, 62228 Calais, France

[b]Laboratoire de Physique du Solide et des Couches Minces, Faculté des Sciences Semlalia, Université Cadi Ayyad, Bd Pr. My. Abdellah, B.P. 2390, 40000 Marrakech, Maroc

[c] Laboratoire des Matériaux Céramiques et Procédés Associés, Université de Valenciennes et du Hainaut-Cambrésis, Z.I. du Champ de l'Abbesse 59600 Maubeuge

[d] I3N and Physics Department, University of Aveiro, Campus Universitário de Santiago 3810-193 Aveiro, Portugal

tachafin@univ-littoral.fr

Les matériaux ferroélectriques de classe pérovskite et de formule (ABO_3) ont largement contribué au développement d'applications électromécaniques, électroniques et micro-ondes. En particulier, le matériau $BaZr_xTi_{1-x}O_3$ (BZT) présente l'intérêt de se substituer au $Ba_xSr_{1-x}TiO_3$ en raison de sa forte permittivité diélectrique, de ses pertes diélectriques relativement basses et de sa bonne stabilité chimique [1].

Les échantillons céramiques ont été préparés par la méthode de la réaction solide. Les mesures de la permittivité et des pertes diélectriques des échantillons en fonction de la température ont été effectuées de 20 K à 400 K et de 100 Hz à 500 kHz.

La caractérisation diélectrique du matériau $BaZr_xTi_{1-x}O_3$ avec $0 \leq x \leq 0.9$ a permis de classer cette famille de matériaux en 3 catégories suivant leur comportement ferroélectrique : pour un taux de zirconium $x \leq 0{,}15$, les céramiques sont ferroélectriques classiques, pour $0{,}2 \leq x \leq 0{,}3$ elles présentent une transition diffuse, tandis que pour $x \geq 0{,}35$ elles sont ferroélectriques relaxeurs. La caractérisation ferroélectrique de ce matériau à l'ambiante et pour un champ électrique appliqué typiquement de -30 kV/cm à 30 kV/cm, a mis en évidence des cycles d'hystérésis à l'état ferroélectrique classique et à l'état de transition diffuse. A l'état relaxeur, les cycles d'hystérésis sont plus étroits et les polarisations rémanentes plus faibles.

A la recherche de meilleures propriétés diélectriques du matériau BZT, des céramiques obtenues par substitution au niveau des sites B des ions titane par du zinc et du niobium d'une part et par du bismuth d'autre part ont été préparées, pour un taux x=0,1 en zirconium correspondant à un comportement classique du matériau BZT. Les caractérisations diélectriques des céramiques BZT dopées montrent que le comportement relaxeur est induit dans le matériau BZT à partir d'un taux y=0,1 en Zinc et Niobium dans les céramiques $BaZr_{0.1}Ti_{0.9-y}(Zn_{1/3}Nb_{2/3})_yO_3$[2] et d'un taux z = 0,075 dans les céramiques $Ba_{(1-3/2z)}Bi_zZr_{0.1}Ti_{0.9}O_3$ [3].

***Mots-clés**: Matériau, BZT, Ferroélectrique, Relaxeur, Cycle d'hystérésis.*

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OA2
Dielectric Aspects of Hyperbranched Polymers

Gamal TURKY

National Research Centre, Bohoos Str, Dokki, Cairo, Egyp

gamalturky@yahoo.com

Recently a wide variety of hyperbranched polymers were prepared using polycondensation reactions of AB_2 and characterized using different techniques such as: NMR, XRD, DSC, TGA,… etc. Broadband Dielectric Spectroscopy (BDS) was employed to study the dielectric properties of many of the prepared samples. We will focus here on hyperbranched polyester and polyesteramides with different terminal groups. At the temperature region of the glass transition the enhanced conductivity contribution to the dielectric losses masks any features of the loss spectra at relatively low frequencies and thus we were not able to study the segmental relaxation which is associated with the glass transition It becomes possible to determine from the dielectric spectra separately the number density and the mobility of the charge carriers and the type of their thermal activation. The temperature dependence of the DC conductivity is found to be similar

to that of the mobility while for the number density an Arrhenius-type thermal activation is found.

OA3
Dielectric and vibrational study of the unsaturated polyester composite reinforced with Alfa/Wool/thermo-binder fibers

M. A. OMRI[1], A. TRIKI[1], M. GUICHA[2], M. BEN HASSEN[2], M. AROUS[1], H. A. El HAMZAOUI[3], A. BULOU[4]

[1]Laboratoire des matériaux composites, polymères et céramiques, FSS 3018 (Tunisia)

[2]Laboratoire de recherche textile, ISET Ksar Hallel (Tunisia)

[3]Laboratoire des matériaux, INRST Borj Cedria (Tunisia)

[4] Laboratoire IMMM, Université du Maine, Le Mans (France)

trikilamacop@yahoo.fr

Dielectric study was investigated in order to probe the interfacial region between fibers and matrix of the unsaturated polyester composite reinforced with Alfa/wool/thermo-binder (PET/PE) fibers in the relative volume fraction 17:2:1. Dielectric spectra were measured in the frequency range from 10^{-1} Hz to 10^{6} Hz and temperature interval from 40°C to 150 °C. This study revealed the presence of two dielectric relaxations in both matrix and its composite. The first one was attributed to the α mode relaxation associated with the glass transition of the matrix. Whereas the second one was associated with the conductivity which is a result of the carriers charges diffusion noted for high temperature above glass transition and low frequencies. This study didn't show the presence of the interfacial polarization effect in the composite. For this reason, this study was accomplished with vibrational one performed by using the FT-IR and Raman techniques. These latter confirmed the existence of interaction between the reinforcement and the matrix. Indeed, the FTIR measurements evidenced an additional valence vibration originated from wool fibers whereas RAMAN ones revealed the presence of hydrogen bonds between the resin and the reinforcements.

OA4
Space Charge Measurement in Dielectric Materials

S. BOUMOUS[1], Z. BOUMOUS[1], S. BELKHIAT[2]
[1]LEER Laboratory, Mohamed cherif Messaidia University Souk Ahras, 41000, Algeria
[2]DACHR Laboratory, Ferhat Abbas University , Setif, 19000, Algeria
boumous@yahoo.fr

The work presented in this paper employs alternative thermal wave method (ATWM), few used in the ceramics study, to measure the space charges and electric field distributions in BaTiO3 and PZT. The thermal step based on a periodic thermal disturbance and the mathematical treatment of the thermo-dilatation current, using the finite volume method (FVM), allows to calculating the distribution of the space charge and electric field. An algorithm is developed for that by solving the heat diffusion equation between electrodes. The space charges in thickness, due to ageing under high electric field, have been measured on BaTiO3-based ferroelectric ceramic. The hysteresis loops of the two ferroelectrics are drawn and discussed.

***Keywords**: ATWM, space charge, BaTiO3,PZT, FVM.*

OA5
Diagnosis of the EPDM's electrical aging by partial discharge measurement and SEM analysis

N. ROUHA[1], A. BEROUAL[2]
[1] LGEB, Université A. MIRA de Béjaia, Route Targa Ouzemour, Béjaïa - Algeria.
[2] Ecole Centrale de Lyon, University of Lyon, AMPERE Lab, CNRS UMR 5005, 36 Avenue Guy de Collongue, 69134 Ecully Cedex, France
ceranabougie@gmail.com

This paper presents an experimental study of treeing structures expanding in EPDM (*Ethylene Propylene Diene Monomer)* in a point – plane electrode geometry. Accelerated electrical degradation tests, under alternating 50 Hz electrical field, were realised on this polymer to initiate trees and to follow their propagation (i.e. the tree length).
The diagnosis of EPDM's electrical aging is established, on the one hand by measurement of partial discharges (PDs) occurred within the insulating material and, secondly, by a microanalysis performed by means of a Sweeping Electronic Microscopy (SEM). The recorded partial discharges quantity has reflected the default development in

terms of the tree length; well the chemical analysis allowed seeing the micro structures of the degraded polymer and the changing in its morphology. Different forms of trees as well as their internal texture and the diameter of channels that form them are observed[1,2].

The obtained results show that the aging process is related to the amplitude and the duration of the applied electrical field which governs the tree forms and whose depend on the diameters of the channels and their internal texture[3].

A heat treatment at 100 °C shows an improvement of dielectric characteristics, providing a best tree growth resistance and thence best breakdown strength.

***Keywords**: Solid insulating, EPDM, trees, DPs, SEM analysis*

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OA6

Double Dielectric Mismatch Effect on Exciton Ground State Energy in Spherical Core/Shell Nanostructures

Asmaa IBRAL[1], Asmaa ZOUITINE[2], Safae AAZOU[1], El Mahdi ASSAID[1], El Mustapha FEDDI[2], Francis DUJARDIN[3], M'Hamed EL AYDI[1]

[1]Equipe d'Optique et Electronique du Solide, Département de Physique, Faculté des Sciences, Université Chouaïb Doukkali, B. P. 20 El Jadida principale, El Jadida, Maroc.

[2]Département de Physique, Ecole Nationale Supérieure d'Enseignement Technique, Université Mohamed V Souissi, B. P. 6207 Rabat-Instituts, Rabat, Royaume du Maroc.

[3]Institut de Physique et d'Electronique de Metz, 1 Boulevard Arago, 57078 Metz, France.

eassaid@yahoo.fr

The combined effects of double dielectric mismatch, electron and hole effective mass mismatch and quantum confinement on the ground

state energy and on the wave function of an exciton (*X*) confined in a spherical shape core/shell nanostructure, embedded in a dielectric host matrix, or suspended in an organic solution are studied in the framework of the effective mass approximation and using the Ritz variational approach. The core/shell nanostructure is made by a spherical core of a large band gap semiconductor and a dielectric constant, coated with a spherical layer of a small band gap semiconductor and a dielectric constant and surrounded by a matrix of a dielectric constant . Due to band offsets between core and shell, the correlated electron-hole pair (*X*) is confined in the small band gap material. Owing to the dielectric constant mismatch between core, shell and surrounding matrix, electron and hole pair (*X*) is in interaction with self-polarization charges induced at the boundaries of each semi-conductor. The test wave function used to calculate the exciton (*X*) ground state energy takes into account the coulomb interaction between electron and hole. The theoretical approach developed is applied to the cases of *CdS/HgS, InP/InAs* and *ZnS/CdSe* nanostructures in SiO_2 and in H_2O. It appears that the ground state energy of the exciton (*X*) and the corresponding wave function are strongly dependent on the core radius, the shell thickness, and on the dielectric constant mismatch between the three media.

Keywords : *Dielectric mismatch, Exciton, Core/Shell nanostructure, Polarization charges.*

OA7

Catalytic behavior of RuO_2 films deposited on ferroelectrics films

M. KHACHANE[a,b], J.R. GAVARRI[b], Ch. MULLER[b], M. ELAATMANI[a], A. ZEGZOUTI[a], A. OUTZOURHIT[c]

[a]Equipe des Sciences des Matériaux Inorganiques et Applications, département de chimie, Faculté des Sciences Semlalia, Université Cadi Ayyad BP: 2390, Marrakech, Morocco

[b]Laboratoire Matériaux & Microélectronique de Provence, – UMR CNRS 6137, Université du Sud Toulon Var – BP 20132, F-83957 La Garde, France.

[c]Laboratoire de physique des solides et des couches minces, Faculté des Sciences Semlalia, Université Cadi BP : 2390, Marrakech, Maroc.

manarkhachane@yahoo.fr

Ruthenium dioxide (RuO_2) presents a metallic conductivity in a wide temperature range, arising from the partially filled Ru 4d states [1,2].

In addition, it presents a high thermal stability under air, namely up to 700°C, with a low electron resistivity. The high interest of this oxide resides in the fact that it might be involved in many attractive applications [3]. It might be used as (i) electrode material in ferroelectric memories having improved fatigue resistance, (ii) gate electrode for MOS transistors to overcome the depletion capacitance at polysilicium/SiO_2 interface, (iii) thin-film resistor with excellent temperature stability, (iv) diffusion barrier layer and interconnecting material in integrated circuits [4]. Recently, polycrystalline RuO_2 thin films were envisaged as promising electrodes, for the fabrication of ferroelectric capacitor stacks (electrode/ferroelectric/electrode) to be used as dynamic random access memory (DRAM) and non-volatile random access memory (NVRAM) [3].

In the present work, we deal with a potential application of ferroelectric–catalytic thin layer associations, in the general field of gas sensor technologies. As a first step, we have elaborated multilayer systems and studied the catalytic properties of RuO_2 films deposited on ferroelectric films, in presence of methane gas. In a later step, we should try to investigate the coupling of such catalytic interactions with electrical responses of these ferroelectric layers, in order to develop new gas sensor devices related to surface and bulk acoustic waves technologies. RuO_2 films were deposited using spin coating method from a sol-gel preparation. X-Ray Diffraction patterns Scanning electron microscopy (JEOL JSM- 5500) was used to characterize the surfaces of RuO_2 films deposited on the various substrates.

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OA8

Density Functional Study of structural and dielectric properties of $ZnTe_{1-x}O_x$

A. GUEDDIM[1], L. GACEM[1], N. BOUARISSA[2]

[1] *Materials Science and Informatics Laboratory, Faculty of Science, University of Djelfa, Algeria*

[2] *Department of Physics, Faculty of Science, Science and Technology Unit, King Khalid University, Abha, P.O. Box 9004, Saudi Arabia*

ahmed_gueddim@yahoo.fr

The present work employs the full potential linearized augmented plane wave (FP-LAPW) technique to investigate the structural and dielectric properties of zinc-blende $ZnTe_{1-x}O_x$ with oxygen concentration in the range 0–1. Features such as lattice constant, bulk modulus and its pressure derivative have been reported. In agreement with X-ray diffraction measurement, it is found that the lattice constant of $ZnTe_{1-x}O_x$ does not follow Vegard's law. In addition, the spectral dependence of the dielectric functions of the material system of interest for various oxygen concentrations at energies below and above the fundamental absorption edge are examined and discussed. The calculated static and high-frequency dielectric constants are found to agree reasonably well with those reported in the literature. Other case, our results are predictions. The information derived from the present study may be useful for optical emitters/converters or intermediate/defect band solar cells.

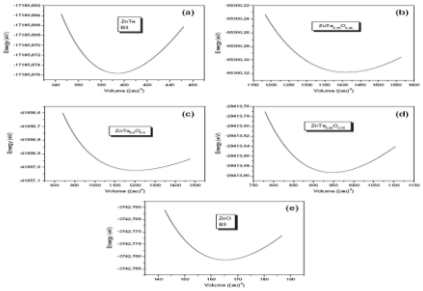

Fig. 1. Total energy versus volume for (a) ZnTe, (b) $ZnTe_{0.25}O_{0.25}$, (c) $ZnTe_{0.50}O_{0.50}$, (d) $ZnTe_{0.25}O_{0.25}$ and (e) ZnO.

OA9

Studies of dielectric relaxation in Flax fibers reinforced unsaturated epoxy

Mayssa KARRAY [1,*], Asma TRIKI [2], Mohamed GARGOURI [1], Pascal PICART [3], Christophe POILANE [4]

[1]*Unité de l'état solide, Faculté des Sciences de Sfax, Route Soukra, 30 18, Tunisie*
[2]*Laboratoire des matériaux composites, polymères et céramiques, Faculté des Sciences de Sfax, Route Soukra, 30 18, Tunisie*
[3]*LAUM UMR CNRS 6613, Université du Maine, Av. O. Messiaen, F-72085 LE MANS, France*
[4]*Université de Caen Basse-Normandie, EA 4257, F-14032 CAEN, France*
* ***mayssakarray@gmail.com***

Dielectric properties on Flax fibers reinforced unsaturated epoxy were investigated. Dielectric spectra were measured in the frequency range from 10^{-1} Hz to 10^{6} Hz and temperature interval from 40 °C to 200 °C. For the composite, four relaxation processes were identified. The first one is the water dipole polarization imputed to the presence of polar water molecules in Flax fiber. The second relaxation process associated with conductivity occurs as a result of the carriers charges diffusion noted for high temperature above glass transition and low frequencies. The third one is the α mode relaxation associated with the glass transition of polymer. As for the fourth process, it is the interfacial or Maxwell–Wagner–Sillars (MWS) relaxation that is attributable to the accumulation of charges at the natural fibers/epoxy resin interfaces. The first and the fourth relaxation were analyzed using the Havriliak–Negami model [1] and their intensities were calculated in order to probe the interfacial region between fibers and matrix. This analysis was accomplished by a thorough study of the fibers/matrix interfacial adhesion aspect, by using a differential scanning calorimeter (DSC) which revealed a decrease of glass transition temperature in the composite compared to that of the epoxy matrix.

Keywords: Composite, Flax fiber, Relaxation, Differential scanning calorimeter, Dielectric spectroscopy.

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A10

Etude diélectrique de titanate de baryum pur et dopé

A. EL BASSET[1], F. ABDI[1,3], T. LAMCHARFI[1,2] ,S. SAYOURI[2] , M. AILLERIE[3]

[1] LSSC, Département de Génie Electrique, FST Route d'Immouzzer, Fès. Maroc.
[2]LPTA, Dépt physique, Faculté des sciences-DM, B.P. 179, Fès. Maroc.
[3]Laboratoire Matériaux optiques, photonique et systèmes, Université Paul Verlaine-Metz,
UMR CNRS 7132,Supélec, 2 rue E. Belin, 57070 Metz France
elbasset-abdelhalim@hotmail.com

Les céramiques techniques, de structure perovskite type ABO3, suscitent un intérêt de plus en plus croissant De part leurs propriétés diélectriques, ferroélectriques, semi-conductrices, et électrooptiques… Parmi cette grande classe de céramiques ferroélectriques, le titanate de baryum reste le plus étudié et de plus en plus attractif pour leurs propriétés très intéressantes, et surtout qu'elles peuvent être améliorées par la variation de sa composition ou par un dopage. Ainsi le dopage à l'aide du strontium (Ba1-xSrxTiO3, BST) a permis une augmentation de la constante diélectrique et une réduction des pertes diélectriques aux basses fréquences.

L'étude diélectrique des céramiques de titanate de baryum pur et dopé au strontium a été entreprise par un balayage de fréquence dans la gamme de 1KHz à 2MHz pour les températures allant de 30°C à 200°C. Notre présent travail a pour but d'étudier, sur céramique, par diffraction des rayon X , par spectroscopie Raman, par Macroscopie électronique à balayage (MEB) et aussi par la spectroscopie de fluorescence X (SFX), les poudres Ba1-xSrxTiO3 qui dérive de BaTiO3, tout en substituant le strontium au Baryum, et notamment d'établir la relation entre leurs structures cristallines et leurres propriétés diélectriques qui semblent intéressantes. L'étude des propriétés diélectrique de BST en fonction de la fréquence et de la température a montré que quelques compositions présentes des anomalies caractérisées par un maximum de la permittivité qui se déplace avec l'augmentation de la fréquence et de la composition x vers les hautes températures, analogue à un effet de relaxation dipolaire. D'autre part Cette étude donne de précieuses informations sur l'évolution du maximum de la constante diélectrique à diverses fréquences de mesure pour les différentes compositions, tel que le

maximum de la constante diélectrique démunie avec l'augmentation de la fréquence dans la gamme de 1KHz à100KHz tandis que elle augmente pour les fréquences compris entre 100KHz et 1MHz**.**

***Mots clés* :** *pérovskite, DRX, MEB, Raman, SFX, diélectrique*

Keywords: *nitride of element III, semi conductors GaN, structure zinc blend, diodes, Photodiode, optimization*

OA11

Dielectric properties of nanostructure Barium titanate / Cobalt ferrite composites

A.M. GHONEIM[1], H.H. AFIFY[2], I. BATISHA[2], I.M.M. MOUSA[2]

[1] *Microwave Physics and dielectrics Department, NRC, Egypt*

[2] *Solids State Physics Department, NRC, Egypt*

ahmagy@ymail.com

Pure $BaTiO_3$ and $CoFe_2O_4$ phases are prepared by sol-gel and autocombustion methods, respectively. Two groups of double phase magnetoelectric composites are prepared by two step chemical method. The dielectric permittivity (ε') and dielectric loss (ε") spectra are measured for all samples. The dielectric permittivity (ε'_{BaTiO3}) and dielectric loss (ε''_{BaTiO3}) of pure $BaTiO_3$ phase is suppressed to lower values by adding $CoFe_2O_4$ phase in the composite. The relaxation frequency is shifted from the lowest value for pure $BaTiO_3$ phase up to the highest value for pure $CoFe_2O_4$ phase. After removing the applied magnetic field, the measured values of (ε') and (ε") is lower than those measured in the absence of magnetic field for all samples. This indicates that the interaction between the magnetic field and electric dipole moments is irreversible and reduces the polarisability.

OA12

Electrical properties of $Cu_{1.8}Zn_{1.1}SnS_4$ for thin films photovoltaic applications: extraction of conduction mechanisms

O. ELLEUCH[a], B. LOUATI, M. HAMDI[a], F. HLEL, M. GARGOURI, K. KIROUNI, A. LAFOND[b]

[a] *Laboratoire de l'état solide, Département de Physique, Faculté des Sciences de Sfax, Université de Sfax, B. P. 1171, 3000 Sfax, Tunisie*

[b] *Institut des Matériaux Jean Rouxel, UMR 6502 CNRS-Université de Nantes, Laboratoire de Chimie des Solides, 2, rue de la Houssinière, BP 32229, 44322 Nantes cedex 03, France*

mgargouri.fss@gmail.com

Quaternary compound Cu_2ZnSnS_4 is new interesting semiconductor material for absorber layer in thin film solar cells [1,2] because of a suitable optical band gap of 1.4–1.5 eV and a large absorption coefficient over 10^4 cm^{-1} [1,3]. Its technology utilizes only abundant and non-toxic metals, leading to a solar cell with low cost and less environmental damage [1,4]. Recently, a conversion efficiency of 9.6 % has been achieved in Cu_2ZnSnS_4 based solar cells [5]. In order to improve the conversion efficiency, it is important to study the properties of some semiconductors derived from Cu_2ZnSnS_4 such as $Cu_{1.8}Zn_{1.1}SnS_4$. The quaternary semiconductor $Cu_{1.8}Zn_{1.1}SnS_4$ has been prepared under vacuum conditions and characterized by X-ray diffraction. The electrical and dielectrical characteristics of the system have been investigated at various frequencies (40Hz – 8MHz) and temperature (80–300 K) by means of impedance spectroscopy. Two conduction mechanisms have been proposed depending on the measurement temperature region. The conductivity data has been analyzed in terms of two theoretical models: nearest-neighbour hopping at high temperatures and the Mott variable-range hopping at low temperatures.

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OA13

Double Dielectric Mismatch Effect on Exciton Ground State Energy in Spherical Core/Shell Nanostructures

Asmaa IBRAL[1], Asma ZOUITINE[2], Safae AAZOU[1], El Mahdi ASSAID[1], El Mustapha FEDDI[2], Francis DUJARDIN[3], M'Hamed EL AYDI[1]

[1]Equipe d'Optique et Electronique du Solide, Département de Physique, Faculté des Sciences, Université Chouaïb Doukkali, B. P. 20 El Jadida principale, El Jadida, Royaume du Maroc.
[2]Département de Physique, Ecole Nationale Supérieure d'Enseignement Technique, Université Mohamed V Souissi, B. P. 6207 Rabat-Instituts, Rabat, Royaume du Maroc.
[3]Institut de Physique et d'Electronique de Metz, 1 Boulevard Arago, 57078 Metz, France.

asmaaibral@hotmail.fr

The combined effects of double dielectric mismatch, electron and hole effective mass mismatch and quantum confinement on the ground state energy and on the wave function of an exciton (*X*) confined in a spherical shape core/shell nanostructure, embedded in a dielectric host matrix, or suspended in an organic solution are studied in the framework of the effective mass approximation and using the Ritz variational approach. The core/shell nanostructure is made by a spherical core of a large band gap semiconductor and a dielectric constant, coated with a spherical layer of a small band gap semiconductor and a dielectric constant and surrounded by a matrix of a dielectric constant. Due to band offsets between core and shell, the correlated electron-hole pair (*X*) is confined in the small band gap material. Owing to the dielectric constant mismatch between core, shell and surrounding matrix, electron and hole pair (*X*) is in interaction with self-polarization charges induced at the boundaries of each semi-conductor. The test wave function used to calculate the exciton (*X*) ground state energy takes into account the coulomb interaction between electron and hole. The theoretical approach developed is applied to the cases of *CdS/HgS*, *InP/InAs* and *ZnS/CdSe* nanostructures in SiO_2 and in H_2O. It appears that the ground state energy of the exciton (*X*) and the corresponding wave function are strongly dependent on the core radius, the shell thickness, and on the dielectric constant mismatch between the three media.

Keywords : *Dielectric mismatch, Exciton, Core/Shell nanostructure, Polarization charges.*

OA14

Dielectric characterization of thin TiO_2 films

Mohamed BEN AMOR [1], Adel MATOUSSI[1],Olivier MAYER[2]
[1] Laboratoire des Matériaux Composites, Céramiques et Polymères (LaMaCoP), Faculté des Sciences,Tunisie.
[2]Laboratoire de Génie Electrique de Paris (LGEP), France
benamormed85@hotmail.com

The dielectric properties of single TiO2 thin films are measured in microwave frequency ranges 1Hz-2 GHz using a coaxial discontinuity technique and BDS Novocontrol spectrometer working at temperature from 170 K to 450 K. These measurements investigate the effects of crystallographic orientation on the electrical conduction and dielectric properties of rutile TiO2 films. Results show high permittivity constants and low conductivity values for the (110) oriented sample in comparison the others directions (100) and (001). This behavior is related to high anisotropy of the chemical composition, the presence of stacking faults and the electric dipolar of TiO2 surfaces. Three relaxation processes have been observed in all the films: interfacial MWS, electron and ionic polarizations.

The conduction mechanism has been identified from the temperature and frequency-dependent conductivity. From Arrhenius plots of the ac conductivity, we have determined the frequency exponent (s) and the activation energy (E_a) of all the thermally activated traps.

OA15

Thermal, structural and dielectric study of various polyvinyle alcohol/ammonium salt composites

Arbi FATTOUM[1], Rached ROUISSI[1], Yessine SOUISSI[2], Mourad AROUS[2]
[1] UR: Matériaux Environnement et Energie, faculté des sciences de Gafsa, cité Ahmed Zarroug 2112 Gafsa, Tunisie
[2] Laboratoire des Matériaux Composites Céramiques et Polymères (LaMaCoP), faculté des Sciences de Sfax, 3000, Sfax, Tunisie
arbi_fattoum@yahoo.fr ; ***djodragon@live.fr***

The thermal stability, structural and dielectric properties of polyvinyl alcohol/ammonium salt composites are studied. We used NH_4Cl and $NH_4CH_3CO_2$ with various molar concentrations lying between 0%

and 20%. Thermo gravimetric analysis (TGA) showed water Wt% content between 4.2% and 5.8%. The glass transition temperature Tg determined by Differential Scanning Calorimetry (DSC) decreases by hydration and by increasing salt composition. The electric conductivity (σ_{dc}) showed a maximum value in the vicinity of 4% for PVA/NH_4Cl but for $NH_4CH_3CO_2$ it decreases monotonically when we increase the concentration from 0% to 20%. The electrical conductivity is attributed to hopping processes of H^+ protons between localization states situated around hydroxyl groups, water molecules and ammonium complexes. We found that dc conductivity is thermally activated and obeys the Arrhenius law only in two regions, low temperature and high temperature, separated by an intermediate region located around the evaporation temperature of water where the conductivity decreases. The ac conductivity studied in the frequency range from 10^{-1}Hz to 1MHz and the temperature range from 10 to 150°C is described by the universal law of Jonsher characteristic of disordered materials. The dielectric study (by electric permittivity and electric modulus) showed the presence of an electrode polarization process which appears at high temperatures and low frequencies and showed a conductivity relaxation due to hopping processes of ions in the bulk. The characteristic frequency of each process depends on temperature and on the nature of the salt and its concentration.

***Keywords**: Polymer composites, ionic conductivity, dielectric relaxation*

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OA16

New Nanoconducting Phantom Composite from Polyvinyl Chloride Reinforced Graphite/Nickel for Microwave Medical Imaging Applications

F. EL-TANTAWY[1], A.A. AL-GHAMDI[2], E.H. EL-MOSSALAMY[4]

[1] Department of Physics, Faculty of Science, Suez Canal University, Ismailia, Egypt
[2] Department of Physics, Faculty of Science, King Abdulaziz University, Jeddah, P.O.80203, Jeddah 21569, Kingdom of Saudi Arabia
[3] Department of Chemistry, Faculty of Science, King Saud University, Riyadh, P.O. 2455, Riyadh 11451, Kingdom of Saudi Arabia
[4] Department of Chemistry, Faculty of Science, King Abdulaziz University, Jeddah, P.O. 80203, Jeddah 21569, Kingdom of Saudi Arabia

faridtantawy@yahoo.com

A novel dry phantom nanoconducting composites that can simulate the effect of electromagnetic wave on human tissues, composed of graphite/Nickel nanoparticles (GN) and polyvinyl chloride was successfully fabricated. X-ray diffraction (XRD), scanning electron microscope (SEM) and thermal-gravimetric analyses (TGA) were used to characterize the structure and properties of the obtained nanocomposites. The thermal stability of the composites was also affected by GN dispersion in PVC matrix. The increasing content of GN in the PVC matrix gradually improves the thermal stability of the nanocomposites. The thermal conductivity, thermal diffusivity and specific heat of composites enhances with GN loading level increases into nanocomposites. Dielectric parameters such as dielectric constant, loss factor and ac conductivity are evaluated in the frequency range of 0.5-12 GHz. The results are compared with the in vitro equivalent human tissue data and good agreement is reported. These nanocomposites are also useful as coupling media in microwave medical imaging applications.

Keywords : *Nanoconducting composites, dry phantom, microstructure, thermal and electrical properties, microwave properties*

OA17

Physical and dielectric properties of Bio-waste reinforced poly (vinyl chloride) composites

A. MOHAMED BEN ALI[1*], A. GASMI[2], A. BOUKERROU[3]

[1]Laboratory of chemistry, Faculty of Science, 20-08-55 University, El-Hadaeik Road, P.O. Box 26, Skikda 21000, Algeria

[2]Laboratory of Solid State Physics, University badji mokhtar, P.O. Box 12, Annaba23000Algeria-

[3]Laboratory of Organic Materials, University Abderrahmane Mira, Bejaia 06000, Algeria

benali_amel2003@yahoo.fr

Over the past decade natural fibres have found use as a potential resource for making low cost composite material. The effect of fiber loading and fiber treatment on physical and dielectric properties of ompression-moulded lignocellulosic fibers–PVC composites was studied. It was found that, the density decreases with increasing the amount of reinforcement due to the increment in the void fraction. The value of dielectric constant (K) and dielectric loss (tan δ) are increases with increasing fibers amount due to the absorption of moisture at the fiber resin interface. They also found the changes in the dielectric constants of acetylation and heat treated natural fibres reinforced PVC composites. The moisture content decreased as a result of treatment. Hence that part of the orientation polarization which was due to the presence of polar water molecules decreased, reducing the dielectric constant of heated fibre composites compared to the untreated ones[1]. In this case the orientation polarization, which was due to water molecules, was decreased to some extent by acetylation[2].

Keywords: *polymer composite, density, dielectric loss, polarization.*

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OA18
Dielectric relaxation kinetics at higher temperature mode in cellulose

N. BENREKAA, R. SAOUD, Z. GUEBAILI, A. ABDALLAH, I. BAYOU, C.A. GUERBI

Department of Materials Physics, Faculty of Physics, University of Sciences and Technologies USTHB, BP 32, El Alia, 16111, Algiers, Algeria

nbenrekaa@usthb.dz

The complex dielectric permittivity was measured by dielectric dynamic spectroscopy (DDS), from 10-1 to 106 Hz. Thermally stimulated depolarization current technique (TSDC) is used in this work to investigate molecular mobility of cellulose. The comparison between the activation enthalpy values obtained by both techniques allows assignment of the α-mode to cooperative movements of nanometric sequences of the main chain. The model strong/fragile is used to explain the Arrhenius behavior of this mode.

Keywords: *Dielectric relaxation; thermally stimulated depolarization current; cellulose.*

OA19
Magnetic properties of FeAl powders produced by mechanical alloying

M. MHADHBI[1], J. J. SUÑOL[2], M. KHITOUNI[3]

[1]Laboratory of usful materials, INRAP, Technopol of Sidi Thabet, Sidi Thabet 2020, Tunisia

[2]Dep. de Fisica, Universitat de Girona, Campus Montilivi, Girona 17071, Spain

[3]Laboratory of Inorganic Chemistry, Sciences Faculty of Sfax, Sfax 3018, Tunisia

mohsen.mhadhbi@inrap.rnrt.tn

Nanostructured disordered Fe(Al) solid solution was obtained from mechanical alloying (MA) of Fe and Al elemental powders using a planetary ball mill. The transformations occurring in the material during MA were studied using X-ray diffraction. The transformation of the phase depends upon the milling time. With the increase of milling time all Cu atoms became dissolved in the bcc Fe and the final product of the MA process was the nanocrystalline Fe(Al) solid solution with a mean crystallite size of 8 nm. Scanning electron microscopy (SEM) was employed to examine the morphology of the samples as a function of milling times. Ferromagnetic-to-paramagnetic transformation was

studied by examination of the magnetic measurements and vibrating sample magnetometer. The system showed hard magnetic behaviour.

***Keywords**: Mechanical alloying, Nanostructured materials, X-ray diffraction, Magnetic properties.*

OA20

Electric and Magnetic Properties In Composites Of Polymer And Multiwall Carbon Nanotubes

El Fatmi DAOUDI*, Abdelhamid EL KAAOUACHI, Sahsah HASSAN, Abdlfattah NARJIS, Lhoussine LIMOUNY

Research Group ESNPS, Physics Departement,University Ibn Zohr, Faculty of Sciences, B.P 8106,Hay Dakhla,80000 Agadir,Morocco

daoudi.elfatmi@gmail.com

The strikingly different charge transport behaviors in nanocomposites of multiwall carbon nanotubes [MWNT] and conducting polymer poly-3,4 ethyenedioxythiophene polymerzed with poly-4 styrensulfonate[PEDOT/PSS] at low temperatures are explained by probing their conformational properties using small angle X-ray scattering (SAXS). The SAXS studies indicate assembly of elongated PEDOT/PSS globules on the walls of nanotubes. Coating them partially therby limiting the interaction between the nanotubes in the polymer matrix.This results in a charge transport governed ;ainly by small polarons in the conducting polymer despite the presence of metalic [MWNT]. At T>4K, hopping of the charge carriers following 1D- VRH is evident wich also gives rise to the positive magnetoresistance (MR). However, at T<4 K,the observation of an unconventional positive temperature coefficient of resistivity (TCR) is attributed to small polaron tunnelling. The exceptionally large negative MR in this temperature is conjectured to be due the presence of quasi 1D-MWNT that can aid in lowering the tunnlling barrier across the nanotube polymer boundary reslting in large delocalization.

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OA21
Frequency Dependent dielectric responses of Rock Types from Ewekoro Cement Quarry, Southwest Nigeria.

Olawale Babatunde OLATINSU, Deborah Oluwaseun OLORODE
Department of Physics, Faculty of Science, University of Lagos, Akoka, Lagos, Nigeria.
oolatinsu@unilag.edu.ng

Dielectric measurement was conducted to characterize limestone and its associated rock raw materials from Ewekoro, Eastern Dahomey Basin. Measurement was carried out between 40 Hz and 110 MHz on the rock samples in dry, partial and full saturation conditions with the parallel plate arrangement. Data obtained were analysed using Cole-Cole plot and frequency responses of dielectric constant, dielectric loss, conductivity and loss tangent. Cole-Cole plots of all the rock samples indicate a distribution of relaxation times which is common for multicomponent systems and is in agreement with the result from preliminary geochemical analysis. All the rock types show dielectric constant and conductivity dispersions in dry, partially saturated and fully saturated conditions. But the frequency range for this dispersion differs for the rock types and is dependent on the level of saturation. At partial saturation there was: (i) enhanced polarization with consequent increase in dielectric constant, dielectric loss and conductivity; and (ii) shortening of the region of dielectric dispersion. Despite the fact that polarization was further enhanced in the rocks at full brine saturation condition, the overwhelming effect of salinity

yielded greater conductivity values and narrow dielectric dispersion region. Irrespective of the state of the rocks, values of the dielectric parameters are higher for shale and glauconite than for limestone and sandstone. Geometric or textural effects are partly responsible for these observed differences coupled with the presence of charged clay/clay-like particles in shale and glauconite. Peaks were also observed in dielectric loss and loss tangent. The decrease in relaxation and critical frequencies at partial saturation for shale in contrast to the increase of these frequencies for the other three rock types point to the effect of big pores on overall dielectric relaxation.

***Keywords*:** *Dielectric dispersion, saturation, rock types, interface, frequency response.*

OA22

Electrical transport in dielectric Ge-Se-In thin films

T. PETKOVA[1], A. STOILOVA[2], P. PETKOV[2]

[1]Institute of Electrochemistry and Eenergy Systems, Bulgarian Academy of Sciences, 10 Acad.G.Bonchev, 1113 Sofia, Bulgaria
[2]Department of Physics, TFT Lab., University of Chemical Technology and Metallurgy, 8 Kl. Ohridsky, 1756 Sofia, Bulgaria, Europe
tpetkova@bas.bg

Investigation of physical processes that take place in M-I-M systems as well a precise determination of basic parameters of the semiconductor layer (dielectric permittivity and effective electron mass) and of the potential barrier (electron work function) is of great interest. Thin-films of the Ge-Se-In system were prepared by vacuum sublimation. Film structure has been investigated by X-ray and electron diffraction and their composition has been analysed by Auger electron spectroscopy. All samples are amorphous without defects. The d.c. conductivity of thin-film samples has been measured at values of the applied electric fields up to 10^9 V/m at room temperature. From the current-voltage characteristics the basic electrical constants of the layers have been derived. Results obtained from the D.C. of a Metal-Chalcogenides-Metal system show that a region of extended thermionic emission and intermediate emission is observed. Under the experimental conditions used the dielectric

permittivity does not depend significantly on the indium content while the influence of the dopant concentration on the effective mass is very stronger. The experimental data obtained in this study are in good agreement with Christov's theory of injected electron currents.

***Keywords**: thin films, chalcogenide glasses, electrical properties, dc conductivity.*

OA23
Molecular Dynamics and Electric Conductivity Process Efficiency in Selected Proton Conductor

M. ZDANOWSKA-FRĄCZEK[1] , K. HOŁDERNA-NATKANIEC[2], P . ŁAWNICZAK[1], Cz. PAWLACZYK[1]

[1] Institute of Molecular Physics, Polish Academy of Sciences, Smoluchowskiego 17, 60-179 Poznań, Poland

[2] Department of Physics, Adam Mickiewicz University, Umultowska 85, 61-614 Poznań,Poland

mzf@ifmpan.poznan.pl

The anhydrous heterocyclic molecules based materials are a possible alternative material for membranes in fuel cells operating in the intermediate temperature range. Similarly to water, heterocycles exhibit the ability to form a hydrogen bond network with a low proton transfer barrier. They are amphoteric, i.e. can serve as donors and acceptors of protons and easily undergo autoprotolysis. Embedded into a polymer or crystalline matrix, they can improve the relevant properties of the new materials. Benzimidazolium azelate (abbreviated as BenAze) and benzimidazole (abbreviated as Ben) are generally assumed as model compounds to study a relationship between the hydrogen bond network, molecular dynamics and the electric conductivity process efficiency in an anhydrous system.

The electric conductivity measurements were carried out by means of impedance spectroscopy using a Novocontrol Alpha A Frequency Analyzer in the frequency range from 1Hz to 10MHz. Measurements were made in a wide temperature range, from 120K to above 360K, near the melting point. The temperature of the sample was stabilized to the accuracy of 0.01K using a Novocontrol Quatro Cryosystem. The molecular dynamics as well as the proton motion have been studied by means of ^{1}H solid-state NMR (the continuous wave

method) at 25.5 MHz. Measurements were performed on heating from 100K to 380K.

^{1}H NMR results correlated with those of proton conductivity and crystal structure have shown that conduction of BenAze crystal is a cooperative process involving both molecular motions prior to the proton exchange and migration along the hydrogen bonded chain. The microscopic model of BenAze conductivity as well as proton transfer path is proposed. It is also shown that efficiency of proton conduction process is limited by restrictions in the motion of benzimidazole molecules.

***Keywords**: Proton dynamics; proton conductor; heterocyclic; NMR; fuel cells*

***Acknowledgment:** This work was supported by the funds for Science in Poland as a research project N N202 368 139*

OA24

Effect Of Double Dielectric Mismatch On Electron And Hole Energies In Spherical Core/Shell Nanostructures

Asma ZOUITINE[1], Asmaa IBRAL[2], Safae AAZOU[2], El Mahdi ASSAID[2], El Mustapha FEDDI[1], Francis DUJARDIN[3], M'Hamed EL AYDI[2]

[1]Département de Physique, Ecole Nationale Supérieure d'Enseignement Technique, Université Mohamed V Souissi, B. P. 6207 Rabat-Instituts, Rabat, Maroc.

[2]Equipe d'Optique et Electronique du Solide, Département de Physique, Faculté des Sciences, Université Chouaïb Doukkali, B. P. 20 El Jadida principale, El Jadida, Maroc.

[3]Institut de Physique et d'Electronique de Metz, 1 Boulevard Arago, 57078 Metz, France.

aszouitine@gmail.com

This paper is devoted to double dielectric mismatch effect, conduction band and valence band effective mass mismatch effect and quantum confinement effect on the ground states energies of an electron and a hole confined in a spherical core/shell nanostructure, embedded in a dielectric matrix, or suspended in an organic solution or water. The core/shell nanostructure is made by a spherical core fabricated with a large band gap semiconductor whose dielectric constant is , coated with a spherical layer fabricated with a small band gap semiconductor whose dielectric constant is , the whole structure is embedded in a

dielectric matrix or suspended in an organic solution. Due to band offsets between core, shell and host matrix, electron and hole are confined in the smallest band gap material. So, their energy levels are quantized. Because of the dielectric constant mismatch between core, shell and surrounding material, charge carriers are in interaction with a self-polarization charges appearing at the boundaries of each semi-conductor. The theoretical approach developed is applied to determine electron and hole energies in the cases of *CdS/HgS*, *InP/InAs* and *ZnS/CdSe* nanostructures as functions of the core to shell radii ratio and the dielectric constants of the core, the shell and the host matrix.

Keywords: Dielectric mismatch, Effective mass mismatch, Electron and hole energies, Core/Shell nanostructure, Polarization charges.

OA25
Effective dielectric constant of porous silicon low dielectric constant thin films

K. RAHMOUN[*], S. FAKIRI

[1] *URMER, University of Tlemcen , Abou Bakr Belkaid, BP 119, Tlemcen 13000, Algeria*

k_rahmoun@yahoo.fr

To predict the effective dielectric constant of porous silicon oxidized and unoxidized low dielectric constant thin films[1] , an analytical solution that covers contribution from the components of silicon oxide and voids using a serial parallel capacitance structure based on Vachon and Cran model [2], is used. The statistically fractal porous dielectric is approximate by the typical n-stage model. The comparison between different cases of porous silicon oxidized and unoxidized allowed us predicting low dielectric constant and selecting the best model. Oxidation proved to be a good solution for stabilization the material. The results show reasonable agreement with existing experimental data.

Keywords: Porous silicon, porosity, oxidation, modelling, low-dielectric constant

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OA26

Characterization of ceramic dielectric $Pb(ZR_x,TI_{1-x})O_3$

L. MRHARRAB[1], Y. ABABOU[1], E. ECH-CHAMIKH[2], S.S AYOURI[1]

[1]Laboratoire de Physique Théorique et Appliquée, Département de Physique, Faculté des Sciences B.P.1796, Fès-Atlas, Maroc

[2] FSSM. Marrakech, B.P. 2390, Marrakech, Maroc

mrharrab_lamiae@yahoo.fr

The lead zirconate titanate (PZT_x), with different compositions of Zr (26= x = 78), was prepared by mixing the solid basic oxides TiO_2, $ZrO_2$and PbO. PZT powders obtained were judged of good structural quality without secondary phase which is confirmed from the X-ray diffraction. Pressed pellets, coated and sintered at 900 °C for 4 hours were characterized by dielectric measurements. The spectra obtained showed the presence of a second anomaly in the ferroelectric phase compositions for low zirconium composition and moves to the paraelectric phase for those rich in zirconium. Can research has shown the presence of this anomaly characterizing the PZT material known by their ferroelectricity and piezoelectricity and pyroelectricity making it widely used in innovative industry.

OA27

Study of the structural evolution and the dielectric properties in the $Ba_4(Nd_{1-x}Sm_x)_{9.33}(Ti_{0.95}Zr_{0.05})_{18}O_{54}$ solid solution

M. ABOU-SALAMA[1], K. CHOURTI[1] , P. MARCHET[2], M. KARROUA[1]

[1] Laboratoire de Chimie Physique des Ressources Naturelles et Environnement, Faculté des Sciences d'Oujda - Faculté Pluridisciplinaire de Nador, Morocco

[2] Laboratoire de science des procédés céramiques et de traitements de surface UMR 7315 CNRS, Université de Limoges, Centre Européen de la Céramique, 12 Rue Atlantis, 87068 LIMOGES CEDEX, France

m.salama@ump.ma

Recent studies carried out on the solid solutions $Ba_{6-x}Ln_{8+2x/3}(Ti_{1-a}Zr_a)_{18}O_{54}$ (Lanthanide), in particular the composition limit x = 2 and $0 \leq a \leq 0.1$, have shown an improvement in the dielectric constant and dielectric loss reduction according to the composition x and the nature of the lanthanide.

Sm substitution for Nd was investigated to modify the dielectric properties of $Ba_4Nd_{9.33}(Ti_{0.95}Zr_{0.05})_{18}O_{54}$ ceramics. A single phase solid solution was formed in the range of $0 \leq x \leq 1$. The crystal structure is closely related to the tungsten-bronze type structure with 3x3 octahedral units of perovskite columns (orthorhombic symmetry, s.g. Pnma, a≈22.4Å , b≈7.6Å , c≈12.3Å). The A2 sites (pentagonal channels) and the A1 sites (rhombic channels within the perovskite-like columns) are occupied by Ba and Nd /Sm respectively. The particular rhombic A1' sites located at the junction of two perovskite-like columns accept excess of Nd and Sm .The thermal behavior of the permittivity and, for some compositions, the occurrence of a strong dielectric dispersion in a wide temperature range (relaxor behavior), would likely be connected to cationic disorder in the particular rhombic A1' sites.

Keywords: *Perovskite, Dielectric, Solid solution, Tungsten-bronze*

OA28
Effect of conductive particles on the electrical conductivity of a copolymer matrix

M. EL HASNAOUI[1*], L.C. COSTA[2], M.E. ACHOUR[1], M.P.F. GRAÇA[2]
[1]Laboratoire LASTID, Département de Physique, Faculté des Sciences, Université Ibn Tofail, B.P:133, 14000 Kénitra, Morocco
[2] I3N and Physics Department, University of Aveiro, 3810-193 Aveiro, Portugal
med_elhasnaoui@yahoo.fr

In this work we present a study of the electrical transport properties of carbon black (CB) particles dispersed in an insulating EBA (Ethylene Butyl-Acrylate) copolymer matrix, over the frequency range from 100 Hz to 0.1 MHz, for temperatures between 20 and 130 °C, and for different fractions of CB. Differential scanning calorimetry (DSC) was used as a technique to obtain the melting temperature, $T_m \approx 90$ °C. PTCR and NTCR effects were observed respectively below and above the melting point. The mechanism responsible for the change in resistivity, at this stage, is predominantly tunnelling, as the conductive filler particles are not in physical contact and the electrons tunnel through the insulating gap between them. AC electrical measurements have allowed us to identify different conduction mechanisms in these

composites. At intermediate frequencies, the measured conductivity can be described by the power law, $\sigma_{AC} \propto \omega^{s(T)}$, and at high frequencies, the AC conductivity behavior can be explained in terms of hopping process. The dielectric response was analyzed using modulus formalisms. Haviliak-Negami model fits correctly the data for the highest fractions, and the relaxation parameters show that we are close to a Debye relaxation model. The relaxation frequency extracted from modulus spectrum as a function of temperature obeys the Arrhenius law. The calculated activation energies are independent of carbon black inside the copolymer matrix, which means that these particles do not interact significantly with the chain segments of the macromolecules in the EAB copolymer.

Keywords: *Conducting charges, percolation threshold, melting temperature, PTCR effect, relaxation, activation energy, electrical properties.*

OA29

Etude de la conductivité statique (dc) des niobates de lithium ($LiNbO_3$)

A. EL BACHIRI , F. BENNANI

Université Ibn Tofail, Département de Physique, Kénitra, Maroc

bachiriabdo2009@hotmail.fr

La conductivité statique (dc) de monocristaux du niobate de lithium ($LiNbO_3$) a été mesurée à température différente , par un balayage de fréquence dans la gamme de 1 Hz à 1 MHz pour les températures allant de 300 à 700°C et dans la gamme de 1 Hz à 13 MHz pour les températures allant de 700 à 1000°C.

Les valeurs de la conductivité statique de LN à différentes stœchiométries ont été déduites à partir des diagrammes d'impédance complexe pour chaque température et les droites représentant *log (σ)* en fonction de l'inverse de la température présentent un changement de pente (c.p) à une température seuil.

Nous avons expliqué ce changement par un changement du mode de conduction ; de la conduction polaronique avant la température seuil ; avec une énergie d'activation moyenne de 0,80 eV ; vers la conduction ionique après cette température ; avec une énergie d'activation moyenne de 1,20 eV.

OA30

Effect of indium doping on structural, optical and electrical properties of sprayed-ZnO thin films

A. HADRI[1], M. LOGHMARTI[1], F. CHRAIBI[1], B. FARES[1], L. LAANAB[2], M. BENSITEL[1], A. MZERD[1]

[1] Université Mohammed V-Agdal, Faculté des Sciences, LPM, B.P. 1014, Rabat, Morocco

[2] Université Mohammed V-Agdal, Faculté des Sciences, LCS, B.P. 1014, Rabat, Morocco

adil.hadri.9@gmail.com

Conducting and Transparent indium-doped zinc oxide thin films were deposited by spray pyrolysis technique on glass substrate at 350°C. The effect of the preparation conditions on the structural, morphological, optical and electrical properties of the films has been studied. The molar concentration of ZnO was optimized and the molar ratio of In in the spray solution was varied from 0 to 5 wt%, respectively, in order to obtain films with low electrical resistivity and high optical transparency in the visible region. All the films were found to be polycrystalline and show a (002) preferential growth at low indium concentration. An increase in In concentrations causes a decrease in crystalline quality of films as confirmed by X-ray diffraction technique which leads to the introduction of defects in ZnO. Scanning Electron Microscopy observations show a homogenous surface morphology which was affected by the doping concentration and the cross view of the samples shows an average thickness of 0.5µm. Optical analyses of the deposited films show an average optical transmittance of 85% in the visible region. Indium doping also significantly increased the electron concentrations, making the films heavily n type. The lowest resistivity value of 1Ωcm was obtained for film with 1% indium doping.

Keywords: *ZnO, Spray pyrolysis, thin films.*

OA31

Effect of the electrode interface on the dielectric properties of the epitaxial ferroelectric thin films

Lucian PINTILIE, Ioana PINTILIE, Luminita HRIB, Cristina CHIRILA,
Georgia Andra IBANESCU
National Institute of Materials Physics, Atomistilor 105 bis, Magurele, 077125, Romania
pintilie@infim.ro

$Pb(Zr_{0.2}Ti_{0.8})O_3$ and $BaTiO_3$ epitaxial films were grown on a 20 nm epitaxial layer of $SrRuO_3$ previously deposited on a single crystal $SrTiO_3$ substrate with (001) orientation. All the layers were deposited by pulsed laser ablation. Several metals or conductive oxides were used as top electrodes on the same epitaxial ferroelectric film: Au, Cu, Pt, Al and $SrRuO_3$. It was found that the dielectric properties of the metal-ferroelectric-metal structure strongly depend on the metal used as top contact. Although the shapes of the capacitance-voltage and capacitance-frequency characteristics are similar for different top metals on the same ferroelectric film, the values of the measured capacitance are different. This finding suggests that the dielectric constant of the epitaxial ferroelectric capacitors is controlled by extrinsic contributions introduced by the electrode interfaces. Another interesting finding is that the dielectric behavior of the capacitors made from the two ferroelectric materials, with the same metal electrodes, is different. The analysis of the above mentioned capacitance voltage and frequency characteristics, shows that the equivalent circuit has to include an interface related capacitance, probably Schottky type. The properties of this interfacial capacitance are dependent on the metals used as electrodes. The experimental results suggest that the behavior of the $Pb(Zr_{0.2}Ti_{0.8})O_3$ layer is closer to a wide gap semiconductor while the behavior of the $BaTiO_3$ is closer to a classical polar dielectric. Therefore, although the two materials posses the same tetragonal structure, with similar origin of ferroelectricity, their dielectric properties are different.

***Keywords**: ferroelectric; interface; dielectric constant*

OA32
Modelling of Bipolar Charge Transport in Polyethylene Macro and Nano-Scales under dc Applied Voltages

Imed BOUKHRIS, Ezzeddine BELGAROUI, Ali KALLEL
Laboratoire des matériaux composites céramiques et polymères (LaMaCoP)
Faculté des sciences de Sfax BP 805 Sfax 3000 Tunisia
imed_boukhris@yahoo.fr

Nowadays the use of nanotechnologies in the field of electrical insulation becomes more significant, unfortunately problem of space charge accumulation becomes more pronounced when the material characteristic thickness decreases such as in micro- and nanotechnologies. In this context, we present in this work a bipolar charge transport model taking into account trapping, recombination and detrapping phenomena in low density polyethylene under dc applied voltages. Indeed, we present a comparison between aspects and phenomena observed in macro and nano-scales. In fact, our model results show the charge packet aspects on the net space charge density. In the case of the dynamic of these charge packets, the trapped process has a weak influence in the transport and the dominant mechanisms are attributed to the conduction and the recombination of the bipolar charges. The principal induced effects generated, in submicron scales, by the packet appearance are the intensifications and the oscillations of the injected and the conduction currents, respectively. All these previous aspects were already shown in modeling and experimental works in polyethylene macro-scales.

Keywords: *Polyethylene, macro and nano-scales, modeling, charge packet, injected current, conduction current.*

OA33
Étude du Phénomène de Relaxation Diélectrique dans un Verre Diphosphate $Na_2ZnP_2O_7$ Dopé par le Co^{2+}

M. KHARROUBI[1], L. GACEM[1], H. ASSAD[1], F. HENN[2]
[1]Laboratoire des Dispositifs Micro-Ondes *Et Matériaux Pour Les Energie Renouvelables, Université de Djelfa, 17000 Djelfa, Algeria.*
[2]Equipe Physico-chimie des Matériaux Désordonnés et Poreux, Institut Charles Gerhardt de Montpellier (UMR 5253), Université de Montpellier 2, Place Eugène Bataillon, 34095 Montpellier, cedex 5, France

kharroubi3@yahoo.fr

Le verre est l'un des plus vieux matériaux, utilisé et manufacturé par l'homme. Naturel, sous la forme d'obsidienne dans les temps anciens et synthétisé depuis cinq mille ans, il est issu, principalement, de la fusion de silicates. La part réservée aux autres familles de verre dit "verres spécieux", notamment les verres phosphates, est infime jusqu'à aujourd'hui.

L'intérêt des phosphates vitreux est également important comme matériaux lasers $NaPO_3$, $Al(PO_3)_3$ dopés au Nd^{3+}, comme matériaux destinés au confinement des déchets,… etc.

Pour étudier les propriétés diélectriques de ces verres dopés, nous avons utilisé une méthode spectroscopique de relaxation diélectrique c'est la spectroscopie d'impédance complexe (SIC). A l'aide de cette technique, il a été montré que l'énergie qui permet de caractériser l'interaction entre l'ion et son réseau d'accueil dépend à la fois de la nature de la particule relaxante et du milieu dans lequel elle évolue.

La SIC est une méthode de choix dans la description qualitative et quantitative des phénomènes de conduction. Elle a été appliqué intensivement à la description diélectrique de systèmes aussi divers que les solides divisés polycristalins que les milieux amorphes ou vitreux. Elle consiste à mesurer la réponse d'une pastille soumise à une sollicitation électrique alternative puis extraire du signal les contributions de conduction et de polarisation. Habituellement, cette technique est utilisée en condition isotherme. La détermination de la conductivité enregistrée à plusieurs températures permet d'accéder à des valeurs caractéristiques du phénomène de transport ionique, notamment l'énergie d'activation.

Une théorie microscopique relative au mécanisme de conductivité de polarisation sur ces verres conducteurs ioniques, est proposée et rend compte de compte de façon satisfaisante des résultats expérimentaux.

Mots clés: *Spectroscopie d'Impédance Complexe, Relaxation Diélectrique, Polarisation, Conductivité, Verres Phosphates.*

OA34
Characterization of CdS Thin Films Grown by Chemical Bath Deposition Using Two Different Cadmium Salts

H. MOUALKIA*, A. MAHDJOUB, L. HADJERIS, L. REMACHE, L. HERISSI

Laboratoire des Matériaux et Structure des Systèmes Electromécaniques et leur Fiabilité, Faculté des Sciences et de la Technologie, Université Larbi Ben M'Hidi, Oum El Bouaghi, Algérie

moua_lkia@yahoo.fr

Cadmium sulfide (CdS) is a very important technological semiconductor material for use in a variety of devices such as photodetectors, piezoelectric transducers, solar cells[1], etc. Since it has been used as a window material in high efficiency thin film solar cells based on CdTe and Cu(In,Ga)Se_2. Although other techniques have been used in the deposition of CdS, Chemical bath deposition is a well-established method for enhancing the performance of cadmium sulfide window used in solar cell applications. Recent interest in CBD arises from their potential use in CdS nanotubes[2], in CdS nanowires[3] and in optical materials. Deposition of CdS is based on the condensation of Cd^{+2} ions and S^{-2} on the substrate. Sulfide ions are released by the hydrolysis of thiourea, but Cd^{+2} ions form cadmium complex ($Cd(NH_3)_4^{+2}$ by adding a complexing agent to the Cd salt. These complexes, upon dissolution, results in the release of Cd^{+2} ions, then a heterojunction nucleation and growth take place by ionic exchange reaction with S^{-2} ions. For CdS chemical deposition, different cadmium sources have been used, such as cadmium sulfate, cadmium acetate, cadmium chloride and cadmium nitrate. Several researchers studied the influence of Cd salts on the properties of CdS thin films in order to obtain the desired characteristics which are essential for the production of high efficiency solar cells. In this work we report a comparative study of the effect of cadmium sources on chemical bath deposited thin films cadmium sulfide. Two different cadmium sources; cadmium sulfate ($CdSO_4$) and cadmium nitrate $Cd(NO_3)_2 4H_2O$ have been used.

The optical transmittance is made using Shimadzu 1650 PC UV-visible spectrophotometer in the wavelength range 300–1100 nm.

Layers thickness (d) is measured by fitting the transmittance. The photoluminescence measurements are carried out using Perkin-Elmer LS 50B luminescence spectrometer. The photolumenescence (PL) spectra are recorded with the excitation wavelength of 457 nm. Surface morphologies are performed by atomic force microscopy (AFM) (Pacific Nanotechnology). The latter technique offers digital images which allow quantitative measurements of surface features, such as root mean square (RMS). The crystalline structure is analysed using a BRUKER D8 Advance X-ray diffractometer with $Cu\,K_{\alpha}$ line (wavelength: 1.54Å).

Keywords: *CdS thin films; Cadmium salts; Transmittance; PL; AFM; DRX*

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OA35

Influences de l'effet couronne sur les surtensions dans les lignes et postes électriques de tension nominale de 330kv

N.A. MUFIDZADA[1], H. KADI [1], S. CHERIF [2]
[1]Laboratoire de Conception et de Conduites des Systèmes de Production, Université de Tizi-Ouzou, Algérie.
[2]Faculté de Génie Electrique et d'Informatique, Département d'Electrotechnique, Université de Tizi Ouzou, Algérie.
kadihocine1@yahoo.fr

On considère l'influence de l'effet couronne sur les surtensions dans les lignes et les postes électriques. Afin d'évaluer cette influence un modèle reproduisant l'effet couronne a été élaboré. On trouve que le modèle avec Cinq branches est suffisant pour étudier l'influence de l'effet couronne sur les processus transitoires créés par la propagation des ondes de surtensions impulsionnelles dans les lignes. Les calculs correspondant sont faits pour un schéma ligne- transformateur de tension nominale de 330 kV. Les résultats obtenu montrent que l'effet couronne influe considérablement sur la déformation des ondes de surtensions, par conséquence sur les surtensions dans les

transformateurs. L'influence sur l'amplitude de surtension est environ 6%.La diminution de surtension sous l'influence des augmentations de la capacité et de la conductance de la ligne est plus fort que, l'augmentation de surtension à cause de la diminution de l'impédance caractéristique de la ligne.

Mots clés : *Effet couronne, Surtension, Transformateur*.

OA36

Preparation of new conductive thermosetting composites using low contents of particles

R. SELLAK[1], F. NIEPCERON[1], G. LOUARN[2], J-F. TASSIN[1]

[1]Institut des Molécules et des Matériaux du Mans : UMR CNRS 6283, Département Polymères Colloïdes et Interfaces (PCI)-Université du Maine, Le Mans

[2]Institut des Matériaux Jean Rouxel, UMR CNRS 6502, Nantes

radouane.sellak@univ-lemans.fr

Thermosetting composite can be used in several applications especially in aeronautic constructions. In this field one of challenges is to replace rather heavy metallic materials with thermosetting composites. The disadvantage of using this kind of materials is its lack of conductivity. In order to overcome this barrier, a strategy is to introduce conductive fillers above the percolation threshold. However, addition of fillers usually leads to an increase of viscosity of the formulation which precludes infusing the resin through a porous bed of carbon fibers. In order to solve this problem, we aim at creating a two co-continuous phases material and locate the fillers at the interface in order to decrease the percolation at very low values.

With this view, this study is divided into two parts. The first one concerns the control of multiphase composites in order to get co-continuous morphology by Reaction Induced Phase Separation[1,2] (RIPS). The second part is to formulate a composite material in presence of an inorganic fillers which would be preferentially located at the interface of the interpenetrating system.

We developed several processes in the laboratory which allowed us to control filler localisation in the blend (epoxy phase and/or interface). Diffusion of particles at the interface was observed in situ on thin films during the curing of biphasic thermoset materials opening the

road of bulk conducting materials. Optial microscopy and TEM characterizations proved that the particles were located at the interface between the two phases. A conductivity around 10^{-3} S/cm was obtained using as low as 5wt% carbon black.

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OA37

Elaboration et caracterisation des materiaux ferroelectriques derivant du banana

M. AFQIR[A] . M. KHACHANE[A], M. ELAATMANI[A], A. ZEGZOUTI[A], D. BREGIROUX[C], M. DAOUD[A], A.OUTZOURHIT[B]

[A] Equipe Sciences des Matériaux Inorganiques et Applications , Faculté des Sciences, Université Cadi Ayyad, Bd. My Abdallah, BP 2390 Marrakech, Maroc

[B] Laboratoire de physique du Solide et des Couches Minces, Faculté des Sciences, Université Cadi Ayyad, Bd. My Abdallah, BP 2390 Marrakech, Maroc

[C] Université Pierre et Marie Curie Laboratoire de Chimie de la Matière Condensée de Paris Chimie-ParisTech 11, rue Pierre et Marie Curie 75231 Paris Cedex 05 , France

mohamed.afqir@yahoo.fr

Les matériaux ferroélectriques sont utilisés dans plusieurs dispositifs électroniques et optiques grâce à leurs propriétés diélectriques, piézoélectriques et optiques qu'ils présentent . Particulièrement, lors des dernières années, les ferroélectriques ont attirés beaucoup d'attention comme matériaux de dispositifs des mémoires pour les capacitances à mémoire vive avec une grande densité dynamique « DRAMS » et les mémoires vives ferroélectriques non volatiles « FeRAMS ».

L'ensemble des phases dérivant du **BANANA,** sont des ferroélectriques classiques, de structure Bronze de tungstène quadratique « TTB ». Elles sont souvent élaborées par la méthode conventionnelle des céramiques, exigeant une température très élevée

et un temps de réaction très long . Toutes les préparations des poudres par voie solide, nécessitent un mélange stoechiométrique des produits de départ commerciaux (oxydes, carbonates...) de pureté supérieure à 99% (Merck).
Le mélange des réactifs est bien broyé à la main dans un mortier en agate, puis placé dans une nacelle d'alumine et introduit ensuite dans un four pour subir des traitements thermiques à des températures variant de 500°C à 1200°C .
L'analyse par diffraction des rayons X de l'ensemble des échantillons montre que les poudres obtenues sont des phases pures et bien cristallisées. Ces phases subissaient des caractérisations physico-chimiques parmi lesquelles les mesures diélectriques qui sont réalisées sur des céramiques denses avec un bon retrait.

OA38
Isothermal Charging Currents on Insulting Liquids for Power Transformers Diagnosis

A. BELDJILALI[1], N. SAIDI[1], H. MOULAI[2], M. SAIDI[2]
[1]Physics Materials Laboratory, University of Sciences and Technology of Algiers, BP 32 Bab Ezzouar, Algiers, Algeria
[2] Laboratory of Electrical and Industrial Systems, University of Sciences and Technology of Algiers, BP 32 Bab Ezzouar, Algiers, Algeria
abdeslembeldjilali@gmail.com

The aim of this work is to experiment a new characterization technique of power transformer oils. The principle of this technique is inspired from measurements carried out on solid dielectrics used in high voltage insulation. It will be applied to characterize mixtures between two compatible oils but of different provenances. The obtained results are conclusive and reinforce those gotten by classical physicochemical methods of characterization.
In the present paper, we intent to link between the space charge behavior in the insulation and its several characteristics. Indeed, in addition to the fact that the obtained results are in good agreement with the physicochemical characterizations, the charging currents reported at room temperature enabled us to have an idea on the mixture resistivity and charge carriers' mobility.

***Keywords**: Charging currents; Conduction; Liquid dielectrics power transformer; space charge.*

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OA39

A comparison between the permittivity and electric modulus representations of the microwave response of composites under uniaxial tension

J. BELATTAR[1] , C. BROSSEAU[2], M. E. ACHOUR[1,*]

[1] Laboratoire des Systèmes de Télécommunications et Ingénierie de la Décision, Département de Physique, Faculté des Sciences, Université Ibn Tofail, B. P. 133, 14 000 Kénitra, Maroc.

[2] Université Européenne de Bretagne, Université de Brest, Lab-STICC, CS 93837, 6 avenue Le Gorgeu, 29238 Brest Cedex 3, France

sachoum@yahoo.fr

In this study, the dielectric relaxation (DR) in carbon black (CB)-polymer composites under uniaxial stress is investigated by two complementary approaches: effective permittivity ε^* and electric modulus M^* formally defined as the reciprocal of the complex relative permittivity. Experimental measurements of the microwave data over the of CB volume fractions below the percolation threshold and microwave frequencies studied agree well with the predictions of the Cole-Cole (CC) phenomenological model of DR. For subpercolative systems the CB aggregates show nearly no influence on the DR. However, the relaxation time scale is increased by two orders of magnitude when the CB volume fraction is increased from below to above the percolation threshold at about 8.42 vol%. Extraction of the DR information from CC modeling shows that when the system is subpercolative the DR kinetics is proportional to $\lambda - 1/\lambda^2$, which is consistent with the Gaussian molecular network (affine network) model in the low-strain case.

OB1

Study of nonlinear optical phenomena in photonic crystals based on III-V semiconductors.

B. BENOTSMANE[1], D. DLALI[2], A.AHMADOUCHE

[1]Laboratoire d'Electromagnétisme et d'Optique Guidée, Département de Physique, Faculté des Sciences exactes et Informatique, Université Abdelhamid Ibn Badis de Mostaganem, 27000 Mostaganem, Algeria

[2]Laboratoire d'Electromagnétisme et d'Optique Guidée, Département de génie électrique, Faculté des Sciences et de la Technologie, Université Abdelhamid Ibn Badis de Mostaganem, 27000 Mostaganem, Algeria

[3]Laboratoire d'Electromagnétisme et d'Optique Guidée, Département de génie électrique, Faculté des Sciences et de la technologie, Université Abdelhamid Ibn Badis de Mostaganem, 27000 Mostaganem, Algeria

abenotsmane@yahoo.fr

This work concerns the theoretical studies of nonlinear optics phenomena in photonic crystals based on III-V semiconductors. Photonic crystals, with their lattice dimensions of the order of the wavelength of the light, offer efficient ways to control the propagation of the electromagnetic fields. For instance, by adjusting the opto-geometrical parameters of these structures, it is possible to engineer the dispersion of the matter such as the light propagation is forbidden in every directions of the space. The aim of this work is to demonstrate that this possibility to engineer the dispersion can also be advantageously used to enhance nonlinear interactions between light and matter. We will see that 1D and 2D photonic crystals are adequate structures to obtain efficient frequency doubling because they enable phase matching in very nonlinear materials such as AlxGa1-xAs and the slowing down of the light as well. We will also show that, by combining the nonlinear properties of III-V semiconductors to 2D photonic crystals, it is possible to realize the basic active functionalities for all-optical data processing such as laser sources, amplification, ultrafast switching. We begin by explaining the method of numeral calculations, named nonlinear FDTD to calculate the second harmonic generation in a structure 2D (two-dimensional) arbitrary. The numerical and analytical studies led on the second harmonic generation in the waveguide to photonic crystals 1D and in the 2D photonic crystals are then described. These studies allow to

end in typical 1D and 2D structures which can generate effectively the second harmonic.

***Keywords**: Photonics crystals1, nonlinear optics 2, Dispersion3, Second harmonic generation 4, Waveguide5.*

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OB2
Resonant Electromagnetic Field Distribution on Doped Multilayer Thin Film Structures

B. BOUHAFS, M. BENATALLAH, M. BENDJEBBOUR

Université Aboubek Belkaid-Tlemcen, Fac des Sciences, Laboratoire de Physique Théorique,Tlemcen, Algeria

bouhafs_ben@yahoo.fr

It is well known that the coupling of light to collective oscillation of electrons on metallic surfaces can be carried out with the Kretschmann-Raether geometry. The main potential of this conventional sensor formed by a metal and a dielectric to investigate interface phenomena was recognized in the late 1970s. Under appropriate conditions such as the thickness, d_m and the refractive index, $n_m(\lambda)$ of the metal, the surface plasmon wave (SPW) excited at an angular resonance, Θ_{SPR} (dip position in the reflected intensity) partially absorbs the energy from the probing radiation of a wavelength, λ. The SPW responsible for fascinating phenomena (surface enhanced Raman scattering, extraordinary transmission light) admits a high sensitivity with the index, n_d of the dielectric surrounding the metal film. The latter sensitivity has attracted attention to suggest various nanostructures for chemical and biological sensors applications. In this paper, we use an analytical approach to

describe the potential of a planar doped semiconductor-dielectric gap-doped semiconductor stack to confine and manipulate SP modes coupled by field tunneling through a dielectric gap. Initializing specific parameters of the functional multilayer, we demonstrate the ability of the above sensor to trap multiple SP modes displayed on the reflectance for different charge carriers, N and widths, d_g of a dielectric gap. To include the contribution effect of charge carriers, we adopt the frequency-dependent permittivity, $\varepsilon_{SC}(\lambda, N)$ of a semiconductor (SC) as expressed by the Drude model. With an operate wavelength, in the range 1-20µm of a p-polarized light, and at a fixed thickness, $d_{SC} = 0.2\mu m < \lambda$ of the doped SC, surface 'modes are generated in angular positions, Θ_{SPR} by tuning the width, $d_g = 8.05$ µm. The wavelengths of SPs trapped in the multilayer stack are 22.8, 8.55, and 7.71 µm. However, to underline the main features of the proposed sensor, we report the SP response measured with the conventional sensor on the doped SC-dielectric interface. The apparent discrepancy between performances of the two sensors reveals that light can be stored through nanostructures which promise multiple bio-sensing with an improvement sensitivity; since the full width at half maximum (FWHM) of the reflectance becomes narrower when the width of the dielectric gap increases. Furthermore, the high confinement associated to the light field distribution justifies the ability of the doped structure to be used as a plasmonic circuit.

Keywords: *Surface-Plasmon Wave, Doped Nanostructures, Field tunneling, Dielectric Gap, Bio-sensing*

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OB3

Investigation of the Paraelectric-Ferroelectric Phase Transition in Bulk and Confined Sodium Nitrite

C. KUSOGLU SARIKAYA[1], H. YURTSEVEN[2]
Middle East Technical University, Department of Physics, 06531, ANKARA-TURKEY
ckusoglu@metu.edu.tr

Levanyuk-Sannikov model was used to describe the ferroelectric-paraelectric transition in bulk and confined sodium nitrite ($NaNO_2$). It was found that this model is suitable to describe the phase transition of $NaNO_2$ for the bulk material which shows first order transition close to the second order whereas confined material exhibits purely second order transition. Calculations were performed and the fitted parameters were obtained using the model for the ferroelectric-paraelectric transition in $NaNO_2$.

***Keywords**: Ferroelectrics, Levanyuk-Sannikov model, $NaNO_2$.*

OB4
Phytochimic and pharmacological studies of some Central African medicinal plants with antidiabetic properties

J.N. KOANE[1], T. GOUOLLALY[2], C. NKOUNKOU-LOUMPANGOU[3], J.L. SYSSA-MAGALE[4], J.M. OUAMBA[5]

[1,4]Department of Chemistry, Faculty of Science, University of Bangui, Bangui, Central African Republic

[2,3,5]Unit of Chemistry of the Plant and the Life, Faculty of Science, Marien-Ngouabi University, Brazzaville, Congo- Brazzaville

jnkoane@yahoo.fr

The diabetes constitutes a true problem of public health in the world. It results in a sugar rate abnormally raised, measured in blood in several months of intervals. It is about a chronic metabolic disease which occurs when the pancreas does not secrete insulin: insulino-dependent diabetes (type I) which generally touches the young subject before 30 years or when the pancreas does not produce sufficient insulin and that the secretion of this one is overdrawn; form diabetes found at the adults and the obese ones: noninsulino-dependent diabetes (type II). Indeed, vis-a-vis the noted dissatisfaction of the modern remedies, the traditional phytotherapeutic tracks seem to reinforce an interesting potential, of which the process of development, plant with phytomédicament, through adequate scientific processes, could offer a credible alternative, in favour of the communities.

***Keywords:** Phytochimique, pharmacological, medicinal, antidiabetic plants*

OB5
Thermoelectric properties of semi conducting compound $Sb_{71.22}Co_{2.97}Fe_{20.77}Ce_{5.04}$

M. CHITROUB[1], H.SCHERRER[2]

[1]Laboratoire des Sciences et Génie des Matériaux, Département de Métallurgie, Ecole Nationale Polytechnique 10, Avenue Hassen Badi, BP: 182 El-Harrach 16200 Alger, Algérie

[2]Laboratoire de Physique des Matériaux, Ecole Nationale Supérieure des Mines de Nancy

Parc de Saurupt, 54042 Nancy, France

mchitroub@yahoo.com

Hot-pressed samples of the semi-conducting compound $Sb_{71.22}Co_{2.97}Fe_{20.77}Ce_{5.04}$ were prepared and characterized by X-ray and microprobe analysis. Thermoelectric characterization was done through measurements of the electrical and thermal conductivities as well as the Seebeck coefficient between room temperature and 900K. All samples had p-type conductivity. The dimensionless thermoelectric figure of merit ZT increases with increasing temperature and reaches a maximum value of 1.22 at 873K.

***Keywords**: Semiconductors; Thermoelectric; Hot pressing; $CoSb_3$; Skutterudite.*

OB6
Approche théorique des phénomènes d'absorption des nanotiges métalliques dans un milieu diélectrique sous l'influence d'une onde électromagnétique

C. DAOUDI, M. REMRAM

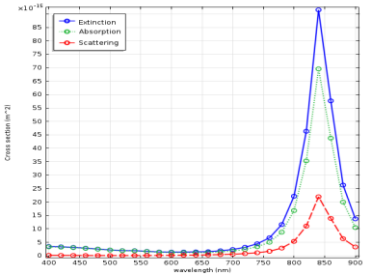
Laboratoire LEMEAMED, Université Mentouri Constantine, Algérie

moh_remram@yahoo.fr

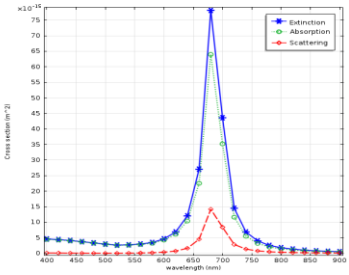
L'intérêt actuel dans les nanotechnologies a suscité un certain nombre d'études sur l'utilisation d'une variété de formes de nanoparticules métalliques (or, argent) dans les applications médicales. Les formes de ses nanoparticules (nanospheres, nanotiges, nanotubes) est un paramètre important pour les différentes applications, en particulier en tant que biomarqueurs sélectifs dans le biodiagnostique ou pour le ciblage sélectif dans la photothérapie [1,2].

Dans cette article nous nous intéressons aux phénomènes d'absorption et d'extinction et de diffusion des nanotiges d'or en fonction de leurs

formes en particulier le rapport (longueur /largeur) de leurs concentrations, dans deux milieux différents(matrices) : l'air et l'eau. En se basant sur la théorie de Mie, et son extension développée par Gans, nous avons remarqué que, sous l'influence d'une onde électromagnétique, la résonance plasmonique de ces nanotiges oscille selon les deux directions de la tige: les directions longitudinale et transversale.



(1a)



(1b)

*Figures 1a et 1b représentent les courbes d'extinction, d'absorption et de diffusion d'une nanotige d'or de taille 82*20nm (a = 41nm, b = c = 10 nm) dans deux milieux differents l'eau et l'air respectivement,*

L'oscillation d'électrons le long de la direction longitudinale induit une forte bande d'absorption dans la région de longueur d'onde plus longue. L'oscillation d'électrons le long de la direction transversale induit une faible bande d'absorption dans la région visible similaire à la bande d'absorption des nanosphères [3].

Mots clés : *nanoparticules, résonance plasmonique,*

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OB7

Effect of the NiFe/Zr interface quality on the magnetoresistance in NiFe/Zr multilayer

K. El AIDOUDI[a], A. QACHAOU[a], M. FARIS[a] , H. LASSRI[b],A. FAHMI[a]
[a]LPMC Faculté de Sciences, Kenitra, Maroc.
[b]LPMatériaux Faculté de Sciences, Ain Chock Casablanca, maroc
aidoudi@hotmail.fr

In this work ,we present a study of giant magnetoresistance(GMR) in NiFe/Zr magnetic multilayer. The GMR behavior versus NiFe magnetic layer thickness (tNiFe) shows one pic of 1.8% at tNiFe =80A , and very low ratio of GMR for tNiFe <40A ,which is attributed to a degradation of the interface quality by the apparition of an amorphous phase at the interface . The representation of the NiFe/Zr interface by a mixed zone in the Johnson-Camley semi-classical model reproduces well the experimental results of MR versus *t*NiFe , confirming thus the important role of interface quality on the electronic transport properties

OB8

Monte Carlo study of a ferrimagnetic nanowire with core/shell morphology

A. FERAOUN, A. ZAIM, M. KEROUAD
Laboratoire Physique des Matériaux et Modélisation des Systèmes (LP2MS), Unité Associée au CNRST-URAC: 08, Faculty of Sciences, B.P. 11201 Zitoune, Meknes, Morocco.
cha3ra_3@hotmail.com

In this work, Monte Carlo simulation based on Metropolis algorithm was used to study the magnetic behavior of a ferrimagnetic particle on a hexagonal lattice with a spin-3/2 core surrounded by a spin-1 shell layer with antiferromagnetic interface coupling in the presence of the crystal field interactions. The influences of exchange interaction couplings between the spin configurations S–σ and σ–σ nearest-neighbor interactions in the appearance of a compensation temperature are investigated. Also, the effect of crystal field on the thermal and magnetic properties of the system is examined.

***Keywords*:** *Compensation temperature; Nanowire; Monte Carlo simulation.*

OB9

The influence of different parameters on the structural and optical characteristics of ZnO thin films

A. RAIDOU[a], F. BENMALEK[a], T. SALL[a] M. AGGOUR[a], A. QACHAOU[a], L. LAANAB[b], M. FAHOUME[a]

[a] L.P.M.C., Faculty of Science, University Ibn Tofail, BP.133-14000 Kénitra, Morocco

[b] L.C.S., Faculty of Science, University Mohammed V, BP.1014 Rabat, Morocco

a.raidou@yahoo.fr

ZnO thin films prepared by the chemical deposition technique, SILAR (Successive Ionic Layer Adsorption and Reaction), by using an aqueous solution of the zinc sulphate $ZnSO_4.7H_2O$ complexed with NH_4OH. Exhibit zincite (hexagonal) structures, are transparent in the visible and infrared region. A series of ZnO films for different parameters (pH, molarities, bath temperature,…) have been deposited on glass by varying this parameters. The effects of this latest on the structural, morphological and optical properties have been investigated.

The XRD results indicate the polycrystalline nature for ZnO thin films with hexagonal phase. The scanning electron microscopy (SEM) reveals different shapes of ZnO formed by the hexagonal grains. The optical studies of the samples show that the energy band gap was decreased with increase in the pH. The optical studies were strengthened by spectrophotometer studies.

***Keywords**: ZnO, SILAR technique, semiconductors.*

OB10

Study and optimization of a Photodiode containing nitride of elements III

Ihsene Yasser TALEB, Nacera GHELLAI, Zakarya ZIANI, Halim BENMANSOUR

Laboratory of materials and Energies renewable - Department of Physics. - Faculty of Science University of Tlemcen13000- Algeria

t_iyasser@yahoo.fr

In our study, we focus on the photodiodes based on nitrides, mainly PIN photodiodes InGaN / GaN. Our work is a simulation based on Mathcad software. Our first approach is to determine precisely the

stoichiometric parameter that must be used to achieve high quantum efficiency that will have direct repercussions on the optimization of other properties such as detectivity. Subsequently, in our modeling was reached at by changing the intrinsic i-layer by InGaN GaN InGaN, AlGaN. The results show that the InGaN photodiode has high sensitivity compared to that in AlGaN or GaN; acceptable performance in the right range of wavelengths, but improvements must be applied at the load capacity as increase our doping and resize our structure, to minimize the reverse voltage applied. Perspective as an experimental approach is desired, to allow knowing the impact of the crystalline quality of the optical and electrical properties of our structure and the use of one or more methods of characterization will enable progress in the development of a photodiode which can be marketed.

OB11
Etude théorique de la structure et des propriétés électroniques des clusters de type $M_6 L_{14}$ (M= Mo, Fe, Co, Pd)

Nadia NEBBACHE[1], Youghourta BELHOCINE[2], Ahmed MEGHEZZI[1]
[1]Laboratoire de chimie appliquée, Université de Biskra,B.P. 145, R.P., 07000, Biskra, Algérie
[2]Faculté des technologies, Université du 20 aout 1966, 21000, Skikda, Algérie
nadia_nebbache@yahoo.fr

Les premiers clusters octaédriques à faces pontées de formule générale $M_6L^i_8L^a_6$ synthétisés comportaient les éléments de transition de la gauche du tableau périodique comme le Molybdène et le Tungstène avec des comptes électroniques généralement de 24 EM [1]; et grâce aux travaux de D. Frenske en Allemagne et R. H. Holm aux états unis sur la composés du rhénium [2], la chimie des clusters à beaucoup évoluée et ces édifices ont connu un essor considérable et ont suscité un grand intérêt au niveau mondial. Ces espèces sont maintenant accessibles aux éléments de la droite du tableau périodique comme le Fer et le Cobalt et aux éléments de l'extrême droite tel que le palladium avec des comptes électroniques plus élevés variant de 24 à 48 EM [3].

Des calculs quantiques basés sur la méthode de Hückel étendue (EHT, de l'anglais Extended Huckel Theory) et sur la théorie de la fonctionnelle de la densité (DFT, de l'anglais Density Functional Theory) ont été entrepris afin de rationnaliser la structure de ces composés en fonction de leurs propriétés physiques et de pouvoir ainsi mettre en évidence la relation géométrie/ compte électronique

***Mots clés**: Cluster, Calculs quantiques, DFT, EHT, Compte électronique*.

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OB12

Défaillance de l'Approche Conventionnelle Nouvelles procédures pour la détermination de la deuxième énergie critique E_{2C} sous irradiation permanente

S. FAKHFAKH [1], O. JBARA [2], Z. FAKHFAKH[1]

[1] LaMaCop, Faculté des sciences de SFAX, Route Soukra Km 3, BP 1171, C.P 3000 Sfax Tunisie.

[2] laboratoire d'ingenierie et sciences des materiaux (lism) ea 4695, ufr sciences case 18 bp 1039, 51687 reims cedex 2 - france

slimfakhfakh@yahoo.fr

Un des plus gros problèmes de l'étude des matériaux isolants au Microscope Electronique à Balayage (MEB) à des tensions d'accélération usuelles, est leur tendance à accumuler des charges négatives et par conséquent de repousser le faisceau d'électrons incident au cours de leur observation. L'utilisation des basses tensions d'accélération, permet d'envisager une élimination de l'accumulation de la charge à la surface de l'isolant [1]. Dans ces conditions, il est théoriquement possible de produire des images de bonnes qualités pour les matériaux non conducteurs sans avoir recours au revêtement métallique habituel. Toutefois, afin de déterminer l'énergie à laquelle l'état d'équilibre de la charge est atteint, il est nécessaire de distinguer l'énergie critique E_2 obtenue avec une irradiation par la technique dite "par impulsion", de l'énergie E_{2C} obtenu sous irradiation électronique permanente. Les

prévisions de l'approche conventionnelle (TYA) ne parviennent pas à expliquer le signe (+/-) de la charge observée dans le cas d'une irradiation permanente. Il apparaît donc clairement que l'énergie E_{2C} est le paramètre le plus important pour la description de l'évolution d'une charge dans les isolants sous irradiation permanente et non l'énergie E_2 (pour les isolants non chargés). En conséquence, le premier objectif de ce travail est de proposer une procédure expérimentale pour déterminer la valeur de la deuxième énergie critique E_{2C} et de montrer que l'état d'équilibre de la charge piégée est atteint à cette énergie E_{2C} et non à E_2. Le second objectif est de corréler les valeurs de E_{2C} avec la densité du courant primaire. Un autre point important qui doit être souligné est la différence entre l'énergie critique E_{2C} et l'énergie effective des électrons incidents à l'état d'équilibre E_{eff}^{S}. Les résultats montrent clairement que contrairement à l'énergie E_{eff}^{S}, l'énergie critique E_{2C} est indépendante de l'énergie primaire, alors qu'elle change légèrement avec la densité du courant primaire [2].

Mots clés : *Isolant, Irradiation permanente, énergie critique.*

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OB13
Temperature dependence of lead salts infrared detection capabilities.

S. KOUISSA[1], A. DJEMEL[1], M.S. AIDA[1], M.A. DJOUADI[2]

[1]LPCS Laboratory, Department of Physics, Univ. Constantine, 25000 Algeria

[2]PCM Laboratory, IMN-CNRS, Univ. Nantes, 44000 Nantes, France.

djemelamor@yahoo.fr

In some critical application, lead salt photo-detectors are often used with a Joule-Thomson cooling system to achieve your high performance at compressed air temperature. In our previous work [1,2], This study suggested that recombination effects influence directly the quantum efficiency of detector. It exhibits the analysis of the space charge region at the free surface of semiconductors and the correlation between detection performance and surface states. The

dependence of some detector parameters on surface defect densities N_t, the capture cross section n ,the energy level E_t associated with surface states ,and the comparison of this model with experimental data of responsivity and detectivity are given.

The present papers use this model to explore the dependence of temperature detector on the detections performances. The results of the model are compared with the experimental results for p-PbS and p-PbSe case.

Keywords: Quantum efficiency, lead salt photoconductors, infrared detectors, semiconductors, photocurrent, gain, spectral response, noise, detectivity, p-PbS,p-PbSe.

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OB14

Characterization of phosphoric acid-based geopolymers synthesized at different ages and treated at different temperatures

H. DOUIRI[1], S. BAKLOUTI[2], M. AROUS[1], Z. FAKHFAKH

[1] Laboratoire des Matériaux Composites Céramiques et Polymères, faculté des sciences de Sfax-BP 1172, 3000 Sfax Tunisie

[2] Laboratoire de Chimie industrielle (II), Ecole Nationale d'Ingénieurs de Sfax –BP. W3038 Sfax Tunisie

Mourad.Arous@fss.rnu.tn

A phosphoric acid-based geopolymers was synthesized using metakaolin (Al_2O_3 - $2SiO_2$) and phosphoric acid (H_3PO_4) at ambient temperature, curing for 7days and 28 days at room temperature. The mineralogical compositions of the geopolymer heated to different temperatures were determined using X-Ray diffraction (XRD). Dielectric measurements realized by dielectric spectrometry show that heating the phosphoric acid-based geopolymers at high temperatures resulted in a decrease in their dielectric constant, conductivity and the dissipation factor especially at high frequencies.

The age of geopolymers has also a great effect on their properties. In fact, an important change was observed in the dielectric properties of geopolymers synthesized for 28 days compared to geopolymers synthesized for 7 days.

Keywords: geopolymers, metakaolin, H_3PO_4, XRD, dielectric properties.

OB15

Nanocomposite materials based on polymers and inorganic nanoparticles for photovoltaic application

A. BEN CHAABANE[1], A. ZEINERT[2], F. KOUKI[1], H. BOUCHRIHA[1]

[1]Laboratory of advanced materials and quantum phenomena, department of physic, Faculty of sciences Tunis, 2092 El-Manar I, Tunis, Tunisia

[2]Laboratory of physics of condensed materials,UFR des sciences,Amiens 80039,France

benchaabane.aida@yahoo.fr

Organic/inorganic nanocomposites have attracted enormous interest due to the several advantages over pure organic material such as low cost[1], flexible processing properties[2], possibility of fabrication of large area devices and simplicity of achieving nanoscale sizes using self-assembly techniques[3]Therefore, these materials are very promising for various devices such as light emitting diodes, photodiodes, gas sensors and photovoltaic cells.

In this work, a P3HT/CdSe hybrid solar cell was prepared using different CdSe loadings. The influence of the polymer: CdSe ratio on the device performance was investigated. The electrical transport in the device was studied via current-voltage (I-V) measurements under illumination. The highest device performance was found at 30% loading, the film morphology on the device properties was investigated using AFM microscopy, we found that these parameters depend on the intrinsic properties of a the device as the contact surface organic/ inorganic.

Keywords: nanocomposite, polymer, inorganic nanoparticles , photovoltaic cell

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OB16
Infrared spectrum of single-walled boron carbide BC3

A. EL BIYAALI, M. BENTALEB, B. FAKRACH, H. CHADLI, A. RAHMANI

Equipe de Physique Informatique & Modélisation des Systèmes, Université MY Ismail, Faculté des Sciences, BP 11201, Zitoune, 50000 Meknès, Maroc

elbiyaali@gmail.com

We use the spectral moments method, to calculate the infrared spectra of singlewalled boron carbide BC3 nanotubes. The dependence of the number of the infrared active modes, their wave numbers and intensities on the nanotube diameters, chiralities and lengths was also examined. The vibrational modes were calculated and the analysis was extended to a larger diameter (from 0.5 to 5nm). The calculated wave number of infrared active modes of the BC3 nanotubes are compared with the experimental results reported in the literature.

OB17
Optical properties of nanostructured bioinspired materials

Abdessitir DERAOUI[1,2], Pierre DEFRANCE[1], Alain CORNET[1]

[1] Institute of Condensed Matter and Nanoscience (IMCN) Nanophysics (NAPS) ,Université Catholique de Louvain Belgium

[2]Laboratoire Rayonnement et Matière, Equipe d'Optique Appliquée et Transfert d'Energie, FST de Settat, Université Hassan 1er, BP461 Settat, Morocco

abdessitir.deraoui@uclouvain.be

The nature shows us a great many situations where the optics plays a crucial part, this is particularly the case for birds and insects whose color is usually associated with their behavior as a factor of recognition. This variation of coloration depends on the illumination and depending on the direction of observation: it is the phenomenon of iridescence. The material forming for example the elytra of beetles is the chitin and its refractive index is close to that of ordinary glass. The SEM observation shows that the material is in the form of

multilayer separated by layers of air. These layers disturb the refractive index of chitin and cause multiple reflections which interfere and explain the phenomenon of iridescence.
The models clearly confirm this interpretation, but they also show that it is possible to produce structured surfaces in the laboratory with properties similar to natural structures. The project aims to develop methods for producing samples based on natural structures where optical properties can be interesting. These samples will be characterized by various methods in order to understand its properties. The main goal is to analyze the role of roughness. We determined the optical properties changing of these structured surfaces based on the characteristics of surface roughness and we compared them to those of smooth surfaces.

Keywords: *Optical properties, iridescence, multilayer, roughness, MEMS, structured surfaces.*

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OB18

Study of the Ferromagnetic resonance in thin films of permalloy nanoparticles diluted in an insulating matrix Alumina $(Ni_{81}\ Fe_{19})_{1-x}(Al_2O_3)_x$

M. DIB ; M.ELHARFAOUI ; A. QACHAOU.

LPMC, Physics Department, Faculty of Science, University Ibn Tofail, BP 133, Kenitra 14000, Morocco

mobarekdib@gmail.com

Ferromagnetic resonance (FMR) is a powerful technique for studying the magnetic properties. It has been applied to many types of magnetic systems. In the present study, we study the influence of the magnetic transition superpara- ferromagnetic in $(Ni_{81}\ Fe_{19})_{1-x}(Al_2O_3)_x$ thin films on the statics and dynamics of magnetization switching by varying both the rate and Permalloy deposition conditions: including the

thickness. We studied the dependence of the derivative of the absorbed power as a function of applied magnetic field. The various contributions to the magnetic relaxation and ΔHpp the linewidth were deduced. These measurements were performed in following geometries: the field is applied in the film plane and parallel to the easy axis and hard axis.

OB19
Votex phase transitions and shot noise in YBCO HTc superconductors

M BGHOUR, A. TAOUFIK, A. LABRAG, A. BOUAADDI, H. ELHAMIDI, B. LMOUDEN, A. ABDELHALIM.
Département de physique, Faculté des sciences, Université Ibn Zohr, Agadir Morocco
bghourmustapha@yahoo.fr

The puzzling problem of the dynamic of vortices in HTc superconductors continues to attract more and more attention of researches in the field of superconductivity. Many attempts [1~3] to understand the mechanism responsible of the kinetics of such systems did not lead right now to satisfaction. In this regard, we tried in our work to use the noise measurements which consists a very valuable technique to investigate the vortices behaviour in superconducting materials [4]. Our main finding can be summarized as follows: the calculation of the time transit and then the vortices mean velocity in our samples show that the shot noise model can explain qualitatively our results. Nevertheless when we estimated the power spectral density noise SV(T) as it is suggested by this model, we find out that there is a very large discrepancy between experimental and theoretical results in spite of the qualitative agreement between the two results. We concluded that the shot noise model can explain the noise shape of our samples but seems to be incapable to describe the results quantitatively [5].

***Keywords**: Vortices, voltage noise, phase transition, shot noise*

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OB20
Attenuated total reflection infrared and XPS spectroscopy analysis of the natural ageing of polyethylene samples

M. HAMZAH[a], M. DARHOURI [a], A. RJEB[a], S. SAYOURI[a], D. SQALLI HOUSSAINI[a,b],
[a] LPTA, Faculté des sciences Dhar El Mahraz, Université Sidi Med Ben Abdallah BP 1796 Fès Atlas, Maroc
[b] Département de Génie industriel, Faculté des Sciences et Techniques, Université Sidi Med Ben Abdallah BP2202 Fès
hamzah.13.mohammed@gmail.com

This article discusses photo-oxidation degradation of both unstabilized low density polyethylene (LDPE) and LDPE stabilized by the hindered amine light stabilizers (HALS), as result of outdoor factors. This polymer is used for greenhouse covering. The efficiency of the HALS incorporated in the polymer matrix is also discussed. The UV stability was investigated by exposing samples at 45° towards south in the direct sunshine during four months.

The natural (outdoor) weathering effects were followed with the attenuated total reflection Fourier transform infrared spectroscopy (ATR-FTIR) and XPS spectroscopy in order to evaluate the chemical composition, know the nature of the chemical bonds established, and the change that occurs on the surface of either polyethylenes. The main chemical modifications were formation of vinyl and carbonyl groups of various kinds identifiable in the ATR-FTIR and XPS spectra of degraded polyethylene samples.

During outdoor exposure, it was found out that the oxidation level grew much faster in unstabilized LDPE than in stabilised LDPE. Carbonyl and vinyl groups arise from the well known Norrish II reactions. The presence of HALS can decrease the oxidation level of the material and contribute to the retardation of photo-oxidation process.

Keywords: Polyethylene LDPE; Natural weathering; Photo-oxidation; ATR-FTIR spectroscopy, XPS spectroscopy; HALS.

OB21

Magnetoelectric phenomena in trilayered composites: experiments and modeling

Rabah BELOUADAH[1], Daneil GUYOMAR[2], Benoit GUIFFARD[2], Nadir BELDJOUDI[3]

[1] Département de physique, Université de M'sila, PB 116 Ichebilia, M'sila, Algérie.
[2] Laboratoire de Génie Electrique et Ferroélectricité, INSA-Lyon, Bât. Gustave Ferrié, 8 rue de la Physique, 69621 Villeurbanne Cedex, France
[3] Laboratoire de physique théorique, USTHB Alger.
r_belouadah74@yahoo.fr

This article reports on the magnetoelectric (ME) effect observed in trilayered polymers consisting of polyvinylidene fluoride (PVDF) and polyurethane (PU) filled with magnetically hard magnetite Fe_3O_4 or the dia-magnetic material (Bi_2O_3). The samples had the following compositions: (PU+2% wt Fe_3O_4 /PVDF/ PU+2% wt Fe_3O_4), (PU+10% wt Bi_2O_3 /PVDF/ PU+10% wt Bi_2O_3). In order to calculate and study the influence of the first and second-order ME coefficients on the dc magnetic field induced phase-switching phenomenon between dynamic ME current and applied ac magnetic field, this paper presents a model based on a driven damped oscillation system. The simulated results obtained with this model were compared to experimental data and a good agreement was found.

Keywords: *magnetoelectric effect, polyvinylidene fluoride, multilayer, magnetic particles, composites.*

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OB22

Effective stabilization of temporal and spectral profiles of soliton light pulse, strongly distorted by higher order effects in optical fiber systems

J. ATANGANA[1], B. MOKHTARI[2], B.G. ONANA ESSAMA[3], N. CHERKAOUI EDDEQAQI [2], T.C. KOFANE[4]

[1]Department of Physics, Higher Teacher's Training College of Yaoundé, University of Yaoundé I, Cameroon.

[2]Department of Physics, Faculty of Science, Moulay Ismail University, Meknes, Morocco

[3]Laboratory of Electronics, Department of Physics, Faculty of Science, University of Yaoundé I, Cameroon.

[4]Laboratory of Mechanics, Department of Physics, Faculty of Science, University of Yaoundé I, Cameroon.

atanganajaques@yahoo.fr

The main purpose of this work is to present the major role played by the spatial variations of the fiber parameters and their best evaluation to be most adapted in the stabilization of light pulse in spectral and temporal domain when the higher order effects are considered. Fiber appropriate in our purpose ideally should have a sufficiently high nonlinear coefficient and a large group velocity dispersion slope, in order to observe nonlinear interactions, acting on the temporal and spectral profile light pulse as strong perturbations. For this end, the collective variable approach will be the analytical and numerical method to evaluate the behaviour of specific parameters of light pulse during the stabilization process.

OB23

Experimental study of opening arcs in the air of AgNi contacts

Takwa EL BEKRI , Leila CHAÂBANE

Electrical department Tunisian national school of engineers Tunis, Le Belvedere 1002 Tunis,Tunisia

elbekri_takwa@yahoo.fr

Improving the reliability of switch devices requires the study of the major parameters that degrade contacts surface, such as the electrical arc. In this paper, the characteristics of the DC air opening arc is investigated for AgNi contacts[1] as well as consumed electrical energy. Thus, voltage testing 42V DC is performed to study the air arc

behavior for, resistive and inductive loads, current varying from 2.5A to 37.5A and opening speed of 5cm/s and 20 cm/s.
Indeed, in the air dielectric[2] between AgNi contacts, the arc duration[3] increases by reducing speed and increasing current. Thus, it is more important for an inductive load that nearly reaches 30ms compared to a resistive one which does not exceed 10ms but it follows the same pace that depends on speed, load and current.
The erosion[4] tests were carried out with a current of 10A. They show a mass loss by a factor of 10 of contacts subjected to an inductive load greater than that of a resistive one and by a factor of 4 for a speed of 5cm/s compared to 20cm/s. For resistive load, mass loss is equilibrated between anode and electrode but it isn't for inductive one. This last phenomenon is due to the intensity and duration of arc, material is ejected out of the contacts surface for inductive load. And finally, electron microscopic analyzes of the contacts show a further degradation by decreasing the speed that describes the electric arc effect in the air on the surface.

***Keywords**: AgNi contacts, air dielectric, arc duration, erosion.*

OB24
An Investigation of the Electronic Properties of Cadmium Telluride using Space Charged Limited Current

Ali M. MOUSA[1], J.P. PONPON[2]
[1]Department of Applied Sciences, University of Technology, P.O. Box 3051, Baghdad, Iraq
[2]InESS, umr 7163, Laboratoire commun Université Louis Pasteur et CNRS, B.P. 20, F67037 Strasbourg, France
alzuhery2000@yahoo.com

The present work reports the D.C. conductivity measurements at high electric fields in a CdTe bulk material. The Current-voltage (I-V) characteristics were measured at fixed temperatures. Two samples, one at high polarization and the other was quasi free were used. At low electric fields, ohmic behaviour was noticed, while, at high electric fields, a non-ohmic behavior was observed. An analysis of the experimental data indicates that in these materials, a space charge limited conduction (SCLC) was observed. The transition voltage (VTR) from ohmic to SCLC is found to be quite

independent of the ambient temperature in the low temperature range. At high temperatures, the transition voltage increased with temperature for the sample with polarization and decreased with the second. Deep Traps estimated from the ln *I* vs 103/*T* plots were found to be within 0.73–0.76 eV in the sample where polarization manifested and 0.5eV in the other. Besides, a range of trap centers with different energies were revealed. Using the relevant SCLC theory, the total trap concentration Nt and the ratio of the free charge to trapped charge θ were found.

Keywords: SCLC, deep levels, CdTe, recombination centers, polarization

OB25
Melt Flow of Ceramic Composite Materials

Abdeali ELALEM
University of Tripoli, Faculty of Engineering, Libya
abdelati.alem@gmail.com

Different techniques are applied in literature for fabrications of ceramic materials for resolving different engineering applications. Composite materials of ceramic origins with polypropylene blend are evaluated in this project at melt temperature. The blend will be melted and processed in single extruder. Calculations will be made to assess the improvement of toughness and resistance to fracture for the blend. Different ceramic materials will be assessed in this study including clay ,kaoline ,and talc blended with polypropylene. Varieties of engineering applications will be tested using the suggested composite blend. Physical, chemical, and mechanical properties will be evaluated for the composite selected in this study. Fracture mechanics theory will be utilized to study the stress concentration to prevent crack formation in ceramic based composite. Creep curves will be constructed for the composites where stress strain time correlations will be calculated and plotted. Mathematical models available in literature will be assessed to select the appropriate model for stress strain time representation including Maxwell ,voigt models and complex models available. .

Keywords : *creep, composite, ceramic material*

OB26
Identification in Alumina of the Intrinsic Properties Governing the Charging Process Under Electron Irradiation

Kamel SAID[1], Gérard MOYA[2], Abderhmane SI AHMED[2], Giles DAMAMME[3], Ali KALLEL[1]

[1]LaMaCoP, Université de Sfax, BP 1171, 3000 Sfax, Tunisie

[2]Im2np, UMR 7334 CNRS, Aix-Marseille Université, 13397 Marseille Cedex 20, France

[3]CEA, DAM, GRAMAT, 46500, Gramat, France

kamel.said@fss.rnu.tn

The charging of insulators under electron irradiation is the result of a competition between the fates of charges, i.e., trapping, annihilation, and transport. The physical understanding of the charging processes is important as it can provide means to meet the conditions favouring either trapping or spreading of charges, depending on the requirements of the usage context. In this work, the charging of alumina materials is investigated using the improved induced current measurement method, developed in a specially equipped scanning electron microscope. This method allows the simultaneous measurement of the currents corresponding to the emitted secondary electrons and the image charges induced in the metallic sample holder. It is shown that the evolutions during irradiation of these currents suggest the possibility to connect secondary electron emission and sample charging. The semi-logarithmic plot of the secondary electron emission ratio against the surface density of trapped charges shows a plateau followed by a linear part towards the maximum value of the net accumulated charges. The experimental results for different primary electron energy and alumina materials (single crystals of different purities and polycrystals of various grain diameters) pave the way for the identification of the relevant physical parameters involved in the charging processes. It is shown that, the level and the extent of the plateau depend on the primary electron energy and the sample characteristics (nature, microstructure and impurities). In contrast for a given material, the slope of the linear part, which appears virtually independent of these parameters, can be associated to the microscopic cross section for electron-hole recombination.

***Keywords**: Charging process, Secondary electron emission, Cross section, Alumina*

OB27

Structural and Cathodoluminescence properties of $Zn_{x-1}Mg_xO$ ceramics

Zayani Jaafar OTHMAN [1], Adel MATOUSSI [1], Franchesca ROSSI[2], Giancarlo SALVIATI[2]

[1]Laboratory of Composite Ceramic and Polymer Materials, Scientific Faculty of Sfax, Tunisia.

[2]Institute of Materials for Electronics and Magnetism(IMEM) , Italian National Research Council,Italy

Jaafar.zayani@yahoo.fr

This paper reports structural, optical and cathodoluminescence characterizations of sintered $Zn_{1-x}Mg_xO$ composites. The effects of MgO composition on these film properties have been analyzed. The hexagonal wurtzite structure of the ZnO material is not affected by the presence of the MgO content at weight percentage x<40%. The preferred growth orientations of grains are (002) and (100) while an improvement of the material crystallinity is observed with increasing the MgO content. The optical band gap energy is found to vary with the MgO composition. Cathodoluminescence (CL) spectra are recorded at room temperature and 77 K under different electron beam conditions. The CL spectra of the ZnMgO composites exhibit three emission bands: ultra-violet (UV) peak near the band gap at λ = 382 nm, a yellow–green light at λ = 520 nm and red light in the region λ = 680-740 nm. The CL intensity of the UV and red emissions are more enhanced than the green light when MgO content increases. CL imaging analysis shows that the repartition of the emitting centers in ZnMgO is intimately connected to the film composition and surface morphology.

***Keywords:** ZnMgO Composites; Cathodoluminescence; X-ray diffraction*

OB28

Optoelectronic and electrochemical properties of a new π-conjugated compound based on pyrrole

O. NINIS[1] , S.M. BOUZZINE[2], M. ABARKAN[1], M. BOUACHRINE[2]

[1] LIMAO, Faculté Polydisciplinaire de Taza BP. 1223, Place de la gare Taza Maroc

[2]UCTA, Faculté des Sciences et Techniques, B. P. 509 Boutalamine, Errachidia, Maroc

ninis.ouafae@yahoo.fr

Pyrrole derivatives have attracted attention due to their diverse electronic, optical and structural properties, which have resulted in their applications in fields such as photosensitization, nonlinear optics, catalysis, liquid crystals and sensing. Thus, a large number of pyrrole-substituted rings have been tailored and studied for the formation of conducting organic films. Using Density Functional Theory method, our main purpose in the present study was to determine the structural properties, the HOMO, the LUMO and the gap energies. We have also investigated the relationship between electrochemical properties and the calculated properties.

OB29

Effect of charge polydispersity in the dynamics of a micellar system

Lamiae TALHA[1], Mohammed FILALI[1], Abdelhafid AZOUGARH[1], Luca CIPELLETTI [2, 3]

[1]Laboratoire de Physique théorique et appliquée (LPTA), Université Sidi Mohamed Ben Abdellah Faculté des Sciences Dhar El Mahraz BP 1796 Fes, Atlas, Maroc.

[2]Université Montpellier 2, Laboratoire Charles Coulomb UMR 5221, F-34095, Montpellier, France.

[3]CNRS, Laboratoire Charles Coulomb UMR 5221, F-34095, Montpellier, France.

lamiae.1984@yahoo.fr

We use dynamic light scattering to investigate a surfactant systems composed of neutral spherical micelles, to which electric charges may be added in a controlled way. The neutral system exhibits one single relaxation mode, due to diffusion. By contrast, two relaxation modes are observed in the charged system. The fast one corresponds to collective diffusion due to fluctuations of the number density of micelles. Following Appell *et al*. [1], we attribute the slow mode to

self diffusion associated with local fluctuations of charge density. Our results support the existence of two relaxation modes in diluted suspensions of weakly charged colloids, in contrast to previous findings.

***Keywords**: dynamic light scattering, surfactant, relaxation mode, diffusion coefficient*

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OB30

Effects of substrate resistance and interfacial traps on the electric properties of Al/SiO_2/Si structure

Omar REJAIBA [1], Mohamed BEN AMAR [2], Adel MATOUSSI [1]

[1]*Laboratoire des Matériaux Céramiques, Composites et Polymères (LaMaCoP), Faculté des Sciences de Sfax*

[2]*Département de Physique, Faculté des Sciences de Sfax –Tunisie*

amorrejieba@yahoo.fr

This paper investigates the electrical behavior of Al/SiO_2/Si MOS like-structure. We are developed a physical model based on analytical resolution of the Poisson's transport equations which is applied for tow MOS equivalent circuits. This modeling is used to predict particularly the effects of substrate doping concentration, silicon resistance and trapped charges at oxide/Si interface on the electric capacitance versus applied voltages at different frequencies. The numerical results obtained by using Maple software demonstrate significant degradation of the MOS capacitance, followed by horizontal or vertical shifting of the C(V) characteristics over their operating accumulation and inversion regimes. The values of threshold voltage V_{th} and flat band voltage V_{FB} are also determined and discussed. Our numerical results are compared to experimental data which showed a good agreement with C(V) measurements.

Keywords: Metal-oxide-semiconductor (MOS), simulation, charge trapping, capacitan

OB31

Caractérisation à l'aide de la simulation Monte Carlo de l'évolution temporelle de la charge piégée dans une cible de quartz soumise à une irradiation électronique

O. MEKNI , B. ASKRI , K. RAOUADI , B. YANGUI
Laboratoire des Matériaux, Organisation et Propriétés, Département de Physique de la Faculté des Sciences de Tunis, 2092 El Manar, Tunis, Tunisie
askri_besma@yahoo.fr

Nous étudions l'émission électronique secondaire d'une cible isolante irradiée par un faisceau d'électrons de quelques keV. Cette étude est menée en fonction des caractéristiques du faisceau primaire et de la nature de la cible. Les résultats expérimentaux obtenus dans des travaux ultérieurs ont montré que le rendement d'émission secondaire varie au cours du bombardement de manière à atteindre un régime stable

Nous utilisons la technique de simulation de Monte Carlo pour expliquer l'évolution temporelle d'émission secondaire et de mieux comprendre la dynamique de la charge piégée au cours de l'irradiation. Cette simulation est menée dans les mêmes conditions de l'expérience et dans le cadre d'un modèle à une dimension.

Cette étude nous a permis ainsi de caractériser l'état de charge d'une cible de quartz amorphe et de distinguer deux comportements différents liés principalement à la capacité de la cible de relaxer les charges piégées. Les résultats montrent que pour un quartz piégeur, la charge piégée tend vers une valeur constante marquant un régime d'autorégulation. Pour un quartz non piégeur, la charge piégée varie linéairement en fonction de la dose injectée. Cette variation linéaire révèle l'existence d'un courant permanent proportionnelle au rayon du faisceau. Les résultats de notre simulation sont discutés en fonction des mesures expérimentales.

OB32

FECG Extraction Using LMS-based Adaptive Noise Canceling Approach

ALI A. EYADEH
Al-Jouf University/Electrical Engineering Department, Sakaka, Saudi Arabia
aeyadeh@yu.edu.jo

Fetal Electrocardiogram (FECG) signal provides reliable information concerning the electrophysiological state of a fetus that could assist clinicians in making appropriate decisions during pregnancy and

labor. In this paper an optimal adaptive filter with a dynamic structure was designed to extract a FECG from composite maternal abdominal signal. Positive experimental results were obtained.

***Keywords**: Abdominal ECG, Adaptive filters, Adaptive noise cancellation, Fetal ECG extraction*

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OB33

L'effet des nanoparticules métalliques d'argent intégrées sur la photoluminescence des nanocristaux de silicium.

A. BENAMI[1], Y. EL HASSOUANI[2], A. OLIVER[3], A. LOPEZ-SUAREZ[3]

[1]OTEA, Département de Physique FSTE, Université Moulay Ismail, Boutalamine B.P. 509, Errachidia, Morocco

[2]Département de Physique FSTE, Université Moulay Ismail, Boutalamine B.P. 509, Errachidia, Morocco

[3]Instituto de Física, Universidad Nacional Autónoma de México. México D.F. 04510, México.

[3]Instituto de Física, Universidad Nacional Autónoma de México. México D.F. 04510, México

abdou_benami@yahoo.fr

Bien que le silicium est le semi-conducteur le plus important dans les industries nanoélectroniques et photovoltaïque, il n'a pas été considéré comme approprié pour des applications optoélectroniques en raison de la nature indirecte de sa bande interdite (gap). Toutefois, lorsque le silicium est sous la forme de faibles dimensions telle que des points quantiques (Si QDs), en raison de l'effet de confinement quantique, ses propriétés optiques et électriques sont très différentes de celles du silicium massif. L'observation de la photoluminescence et l'électroluminescence dans le spectre visible à température ambiante des Si QDs indique leurs potentielles

applications en optoélectroniques[1,2], mais les Si QDs montrent une faible efficacité quantique interne due à la compétition entre la recombinaison quasi-direct et indirect. Pour surmonter cette limitation, l'intégration des nanoparticules métalliques (plasmonique) à proximité des Si QDs a été utilisée dans la dernière décennie[3]. En outre, les dispositifs plasmoniques a base de silicium ont le potentiel de révolutionner de nombreux domaines de recherche allant de l'optoélectronique à la nanomédecine.

Les Si QDs présentées dans cette étude sont obtenus par implantation des ions Si^{+2} à température ambiante, dans la matrice de silice suivie d'un traitement thermique dans une atmosphère réductrice. Implantations ultérieures avec les ions d'argent Ag^{+2} à des énergies différentes (1-3 MeV) ont été réalisées dans le but de faire varier la distance entre les Si QDs préalablement formées et les nouvelles nanoparticules de Ag. Les échantillons ont été étudiés par la photoluminescence, l'absorption optique et la spectroscopie de rétrodiffusion de Rutherford. Une amélioration de photoluminescence est bien mise en évidence à la plus faible énergie d'implantation, mais à des énergies plus élevées, une diminution de l'intensité et une extinction ont été observés.

***Keywords**: Points quantiques de silicium, nanoparticules métalliques, implantation ionique, photoluminescence, plasmonique.*

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OB34

Etude de l'hydrophobicité du parylène par la mesure de l'angle de contact

M. MOKNI, A. SALEM, F. JOMNI, B. YANGUI

Laboratoire des Matériaux, Organisation et Propriétés, Faculté des Sciences de Tunis,

2092 El Manar, Tunis, Tunisie

fethi_jomni@yahoo.fr

Dans ce travail, Nous nous sommes focalisé sur l'étude de l'hydrophobicité du parylène et l'impact du traitement de surface par plasma sur l'état de surfaces des matériaux polymères d'une manière générale.

A partir des mesures de l'angle de contact ainsi que la détermination de l'énergie de surface, nous avons montré que le parylène non traité est un composé hydrophobe. L'effet du traitement de surface par plasma froid se traduit par augmentation de l'hydrophilie de la surface du solide. Ceci est du aux greffages des fonctions polaires qui permettent d'améliorer l'adhésion et la mouillabilité. Dans le même contexte, l'étude de l'énergie de surface du matériau avant et après traitement nous montre qu'il ya une forte augmentation de l'énergie de surface et en particulier la composante polaire du matériau. Ceci est en bonne concordance avec les mesures de l'angle de contact.

Mots clés : *Hydrophobicité, énergie de surface, parylène*

OB35

Cu_2ZnSnS_4 thin films deposited by electrochemical technique for Photovoltaic solar energy

H. KIROU[1], L. ATOURKI[1], L. ALAHYANE[1], K. BOUABID[1], A. IHLAL[1]

[1] Laboratoire Matériaux et Energies Renouvelables (LMER), University Ibn Zohr Dép. Physique, Faculté des sciences B.P.8106, Hay Dakhla, 80000 Agadir, Morocco.

2 Centre de Microscopie, Faculté des sciences, University Mohamed V, 10 000 Rabat, Morocco.

hassancpge@gmail.com

Cu_2ZnSnS_4 (CZTS) thin films were grown by electrochemical methods in acidic electrolyte onto Molybdenum, titanium and ITO-coated glass substrate at room temperature. The obtained films were heat treated under N_2 atmosphere for different temperatures for 1h. Then the films were characterized using X-ray diffraction (XRD), scanning electron microscopy (SEM), and optical absorption. The XRD analyses revealed the formation of polycrystalline CZTS thin films with Kesterite structure upon annealing at 550°C. The optical band gap was estimated to be around 1.5 eV. SEM observations are the films consist in large grains covering the whole surface of substrate. Such encouraging findings show that our CZTS films are a promising absorber layers for low cost thin film solar cells and nontoxic thermoelectric material.

Mots clés: *CZTS, Cu_2ZnSnS_4, Kesterite, electrodeposition, Solar cells.*

B36
Polyiodides Intercaling effects on Raman spectra of single-walled carbon nanotubes

F. FERGANI, A. RAHMANI
Laboratoire de Physique des Matériaux et Modélisation des Systèmes
Université MY Ismail, Faculté des Sciences, BP 11201, Zitoune,50000
Meknès, Morocco
fati.fergani@gmail.com

Single-walled carbon nanotubes (SWNTs) represent ideal nano-confinement systems owing to their one-dimensional (1D) hollow core with diameter comprised between 0.7 and 2 nm [1]. The introduction of guest species into these 1D nano-cavities lead to novel and exciting effects both for the filling entities and the host carbon matrix [2], In fact, induce the important modifications on the physico-chemical properties of the material

The aim of this work is to study the structural and vibrational properties of polyiodide intercalated systems of SWNTs (I@SWNTs).The ion–ion interactions are represented by Morse potential and the molecules inside single wall carbon nanotube interactions are described by Lennard–Jones potential. The nonresonant Raman spectra of I@SWNT peapod were calculated in the framework of bond-polarization theory by using either direct diagonalisation of dynamical matrix or the spectral moments method [3].

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OB37

Exploitation of several artificial intelligence techniques in modeling the XLPE HV cables insulation properties subjected to thermal aging

L. BESSISSA[1,2], L. BOUKEZZI[1], D. MAHI[2], A. BOUBAKEUR[3]

[1]Materials science and informatics Laboratory, MSIL, University Ziane Achour of Djelfa, BP 3117 route of Moudjbara, Djelfa 17000, Algeria.

[2]Laboratory of studies and Development of Semiconductor and Dielectric Materials, LeDMaScD, University Amar Telidji of Laghouat, BP 37G route of Ghardaïa, Laghouat 03000, Algeria.

[1]Affiliation, Post Address, Post Code, Country

[3]L.R.E. / Laboratory of High voltage, Polytechnic National School, BP182, EL-Harrach, Algiers, Algeria.

[2]Affiliation, Post Address, Post Code, Country

l_bessissa2001@yahoo.fr

In this work, we used several techniques of artificial intelligence in modeling of cross-linked polyethylene (XLPE) properties used in high voltage cables insulation, subjected to thermal aging. Given the non-linearity of changes in properties, it is difficult to find a theoretical or experimental models of the insulation properties versus aging time.The investigated techniques are fuzzy logic, genetic algorithms and neural networks.A comparative study has been conducted in order to select the best modeling technique. The results are very encouraging. It is clear from these results that the artificial intelligence techniques are powerful tools that can be used in modeling of the insulation properties. On the other hand the results are in good agreement with the experimental results with errors very acceptable. It would be very economical to employ the techniques of artificial intelligence in the investigation-of-the-HV-insulation. All these neural networks give results close-to-the-experimental, they are in good agreement with the experimental results.

***Keywords**:* Thermal aging, Crosslinked polyethylene (XLPE), Fuzzy logic, Fuzzy Inference System (FIS), Genetic Algorithms (GA), MLP.

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OB38

Electrical properties of $Pr_{0.67}Ba_{0.33}MnO_3$ doped with iron

H. RAHMOUNI[(A)], B. CHERIF[(A)], K. KHIROUNI[(A)], M. BAAZAOUI[(B)] AND S. ZEMNI[(B)]

[(a)] *Laboratoire de Physique des Matériaux et des Nanomatériaux appliquée à l'Environnement, Faculté des Sciences de Gabès cité Erriadh 6079 Gabès, Tunisia.*
[(b)] *Laboratoire de Physico-Chimie des Matériaux, Département de Physique, Faculté des Sciences de Monastir B. P. 22. 5019 Monastir, Tunisia.*
rahmounihedi@yahoo.fr

In order to study the iron effects on the electrical properties of $Pr_{0.67}Ba_{0.33}Mn_{1-x}Fe_xO_3$ (PBMO-Fe), transport measurements have been performed on this compound using impedance spectroscopy technique. When iron is introduced, the insulator-metal transition, observed in free compound, disappears and the electrical conductance decreases when increasing Fe content. These results originate from the reduction of Mn-O-Mn interactions due to the depopulation of hopping electrons by the Fe doping. The AC conductivity studies indicate that different types of hopping are involved. At frequency higher than 10^4 *Hz* the conductance can be fitted by a power law, $G \propto \omega^s$. The exponent "s" decreases when the temperature increases. The variation of the value of "s" with the temperature indicates that hopping model may be the dominating mechanism in the system and proves that the conduction process is thermally activated. The DC conductivity analysis shows that the conductivity is dominated by thermally activated hopping of small polaron at high temperatures and by variable range hopping at low temperatures. Activation energy is deduced from the variation of conductance with temperature. This energy increases with increasing Fe content from E_a=124meV for x=0.05 to E_a=167meV for x=0.20. The application of an electrical

field to the material increases the conductivity and reduces the activation energy for all Fe concentrations. The DC-bias doesn't affect the conduction process but proves its thermally activation. The variation of the conductance with polarization is a proof of an electro-resistance effect.

***Keywords**: $Pr_{0.67}Ba_{0.33}Mn_{1-x}Fe_xO_3$; Perovskite; Hopping; impedance spectroscopy.*

OC1

Molecular dynamics in 1 – and 2-dimensional nanometric, geometric confinement as studied by Broadband Dielectric Spectroscopy

F. KREMER, E. MAPESA, W. KIPNUSU, M. TRESS, M JASIURKOWSKA, C. IACOB
AND W. KOSSACK
Institute of Experimental Physics I, University of Leipzig, Linnéstr. 5, 04103 Leipzig, Germany
kremer@physik.uni-leipzig.de

The question of how the *dimensionality of geometrical confinement* influences the molecular dynamics is up to now unexplored; 1-dimensional (1-D) confinement is realized in nanometer thin layers or films, while 2-D constraints take place for molecules contained in nanopores. Experimental results of poly-*cis*-1,4-isoprene (PI) in thin layers down to 6 nm thickness prepared as part of a nanostructured capacitor arrangement and when deposited in unidirectional nanopores having pore diameters down to 4 nm will be presented. Due to the fact that PI is a type – A polymer having two dielectrically active relaxation processes; one corresponding to the fluctuations of 2 –3 polymer segments and the other being assigned to that of the end-to-end vector of the chain, it is possible to sense the dynamics at two well separated length scales. First results will be presented and compared to studies on the dynamics of low molecular weight glass formers and liquid-crystals confined in 2-D contraints of nanopores.

OC2

Lithium Glasses: Improvements As a Solid Electrolyte

Marisa. A. FRECHERO
INQUISUR- CONICET, Universidad Nacional del Sur, Bahía Blanca, Argentine
frechero@uns.edu.ar

The demand for batteries with high energy densities has inevitably led to the research and development of systems involving thermodynamically more

stable than aqueous electrolytes. In this chapter, we review our results of the last ten years research in tellurite glassy systems where the main ionic carrier is the *Lithium cation*. The main objectives in our work have been to improve not only the ionic conductivity but also some other properties in the glassy matrix, e.g. glass transition temperature, enthalpy of matrix relaxation, etc.

OC3

EFFECTS OF THE INTENSITY FEEDBACK DEPENDENCE OF THE SPATIAL FREQUENCY ON THE SPATIAL SPECTRAL DENSITY OF THE OPTICAL PATTERN FORMATION IN A NON-INSTANTANEOUS SELF-DEFOCUSING MEDIUM

R.A.YADAV, HITESH ADHIKARI

Department of Physics, Banaras Hindu University, Varanasi-221005, India

haihitesh@yahoo.com

We have analysed the effects of the intensity feedback dependence of the spatial frequency on the spatial spectral density of the optical pattern formation in a passive ring cavity containing nonlinear media. The nonlinear medium within the cavity has a non-instantaneous response, that is, it is unable to follow fast random fluctuations of incoherent light. This means that the nonlinear medium in the cavity has a response time much slower than the characteristic phase-fluctuation time of the light, which is the key physical mechanism responsible for the pattern formation in this incoherent cavity. It is also found that the frequency spectrum (i.e., spatial spectral density) of the intensity pattern directly affects the strength of the growth rate (nonlinear gain) of MI (Modulation Instability) and can destabilize or stabilize the beam. This means that as the nonlinear gain starts to be comparable to the cavity loss, the spatial spectral density of the intensity pattern experiences a significant jump. Hence, the transition from the low to high visibility regime has threshold-like characteristics, and occurs approximately when the nonlinear gain becomes equal to the cavity loss. If the nonlinear gain is smaller than the cavity loss, the spatial spectral density at the input is small enough, so that the pattern at the input is regarded as noise with preferential periodicity determined by the spatial frequency. However, if the nonlinear gain is larger than the cavity loss, the intensity structure at the input is more than just preferential noise; this structure guides the light from the input beam into its shape.

OC4
A Time Domain Reflectometry (TDR) method for Dielectric Measurements

A.C. KUMBHARKHANE
School of Physical Sciences, Swami Ramanand Teerth Marathwada University, Nanded 431 606, India
akumbharkhane@yahoo.co.in

The Dielectric relaxation spectroscopy has been used for many years to study the molecular interactions in hydrogen bonded materials. Polyhydric alcohol is one of the hydrogen bonding liquids, where each molecule has two or more –OH groups. In general, polyhydric alcohols exhibit the glass transition at temperature (Tg) relatively higher than those of usual molecular liquids with similar molecular size. Sugar alcohols being considered in this work are one of the polyhydric alcohols, which consist of a linear back bone chain with OH groups attached to every carbon atoms. Glycerol is a typical glass forming polyhydric alcohol and a lot of studies have been performed by various experimental techniques and its dynamics has been investigated from a variety of aspects so far. Sorbital (D-glucitol) is also a polyhydric sugar alcohol and a glass forming liquid. One of the interesting features of glass forming liquids is coexistence of many dynamic processes with different characteristic times.

Recently, we have developed and established the TDR technique in laboratory provides information regarding dielectric permittivity in the frequency range 10 MHz to 30 GHz. TDR method involves the generation of step pulse with rise time of 20 pico-seconds in a coaxial line system and monitoring the change in pulse shape after reflection from the sample placed at the end of the coaxial line. We performed the complex dielectric permittivity measurement for Sugar-water mixtures in the frequency range 10 MHz to 30 GHz using time domain reflectometry technique, which may be anticipated to produce better dielectric relaxation parameters in this frequency range because the permittivity spectra are obtained by a single measurement. The theoretical model to explain the experimental results has been discussed.

Keywords*: TDR, Complex permittivity, Sugar Materials*

OC5

Electromagnetical control of qubit transitions

S.C. KENFACK, A. J.FOTUÉ, L. C. FAI, M. TCHOFFO, R. M. KEUMO TSIAZE,
J. E. DANGA, J. T. DIFFO.
University of Dschang, Faculty of Science, Department of Physics, Mesoscopic and Multilayer Structure Laboratory , Cameroon.
kevinsadem@yahoo.fr

The problem of control stimulates the analysis of qubit states under the control of electromagnetic field. This research study two-level systems in an external environment. We investigate the influence of oscillating electromagnetic radiation field on a qubit.With the aid of the Runge-Kutta algorithm we numerically analyze the changes in transition probability and coupling between states, by solving the quantum dynamical Schrödinger equation.We also investigate the influence of this field in the domain of fast fluctuating field with the aid of the density matrix approach. The coupling between states is renormalized and interaction between states can be technically controlled by the frequency of the field.

Keywords: *Qubit transitions , electromagnetic field, density matrix and transition probability.*

OC6

Integrated Magnetic Components in Print Circuit Board: Integration of Magnetic and Thermal Functions

H. LAGHA [1], H.CHAZAL [2], H.BELMABROUK [1], J. ROUDET [2]
[1] *Electronics and Micrœlectronics laboratory, Physics Department*
Faculté des Sciences de Monastir, 5019 Tunisie
lagha.hajer@yahoo.fr
[2] *Electrical Engineering Laboratory (G2Elab), University of Grenoble, France*
herve.chazal@g2elab.grenoble-inp.fr

Converters power electronics are omnipresent in various industrial systems and home applications. The stresses on these systems are more and more important in terms of compactness, autonomy, reliability and emphasize technological barriers.

To overcome these obstacles, the study of ultra fine component, completely integrated into the Print circuit board, has many benefits. In this paper, we study in the first place, the optimization of physical quantities in polycrystalline materials FeNiCrCu[1]. The approach adopted for modeling magnetic mechanism relative to temperature is as follows[1]:

We begin by characterizing the complex permeability relative to temperature, from this method; we substract physical quantities and we

write a physical scenario which takes into account the variations in the polarizations and anisotropy. The second part, is dedicated to simulate the processor in powers electronics, the system is solved magnetoharmonic coupled with thermal problems in the commercial software Flux 2D. This model generates problems which are related to the geometry of the ribbon, the skin thickness and therefore makes complex mesh. The solution proposed consists in dissociating the magnetic part to the thermal part in the first hand. In the second hand[2], to generate thermal light weight models that can be used on different levels of modeling design overall electronic system[2].

***Keywords**: Integration power electronics, Complex permeability, planar magnetic components, Meander component*

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OC7

Thermal Losses in Power Cables

Aysel ERSOY, Ayten KUNTMAN

Istanbul University Engineering Faculty Electrical-Electronics Engineering Istanbul 34080, Turkey

aersoy@istanbul.edu.tr

Electrical power is provided by two ways those are ; aerial cables and underground cables. The first one carrying the electrical energy by using the aerial cables is still preserve its popularity. However rise in the population living in cities and the growing demand forced electrical suppliers to use underground and underwater crossings more practical than overhead transmission lines. In this study thermal losses in high voltage power cables is experimentally investigated by using a test set up both simulates the aerial and underwater warming effect on high voltage power cables. To measure the temperature variation 2 thermal sensors is located in power cables to the inner and outer amours. Also to see the high voltage power cables behavior clearly, these measurements are done for four different cable sizes. Cable

diameters used in the experiments are 35mm, 70 mm, 120 mm and 240 mm. The aim of this experimental study is to determine temperature distribution over the dielectric used in the cable. Obtained results indicate that increasing the diameter of the cable size lowers the heat dissipation characteristic in the dielectric than small scale cables. Therefore big size cables is exposed to more thermal stresses and its aging process is accelerated.

***Keywords**: Thermal losses, Power cables, dielectric.*

Poster Presentations

PA1
First principles study of structural, elastic, electronic and opticalproperties of CaSrTt (Tt=Si, Ge, Sn and Pb)

A. SAOUDI[1]*, A. HACHEMI[1]*, Y. MEDKOUR[2], H. HACHEMI[1],
[1]Laboratory of Physics Quantic and Dynamic Systems,Department of physics, Faculty of Sciences University of Setif,19000 setif, Algeria
sa_am19@yahoo.fr
[2]Laboratoire d'Etudes des Surfaces et Interfaces des Matériaux Solides (LESIMS), Setif, 19000 Université de Sétif, Algérie.

We present an ab initio study of the structural, elastic and electronic properties of CaSrTt(Tt=Si, Ge, Sn and Pb) compounds. In order to describe the properties of these materials rather well, the calculations were based on the DFT theory with generalized gradient approximation (GGA). In particular, the calculated lattice constants are in good agreement with experiments with a deviation less than 0.67 %, 2.74 % and 1.7 % for a, b and c respectively. For the equilibrium volume, the deviation does not exceed 4.7 %. Single crystal elastic stiffness's (C_{ij}) were calculated and the polycrystalline elastic moduli (B and G) were estimated according to Voigt, Reuss and Hill's approximations. The electronic band structure calculations suggest that these compounds are semiconductors, in agreement with literature data on their analogues[1,2].

Keywords:ab-initio, band structure,Tetrelide phase, elastic modulus.

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PA2
Ferroelectric properties ofthe $[N(CH_3)_4]_2CoCl_2Br_2$compound

A.BEN RHAIEM*, K. KAROUI, K. GUIDARA AND M. GARGOURI
University of Sfax, Faculty of sciences, Laboratory of solid state B. P. 1171, 3000 Sfax, Tunisia.
abdallahrhaiem@yahoo.fr

Hybrid material of generals formula A_2MX_4 (A: organic cation, M: metal = Co, Cu, and Zn, X: halogen = Cl, Br, I) have attracted

considerable interest due to their multiple phase transitions related to the dynamics of the organic cations and inorganic anions. Interest in these compounds is rapidly increasing, as some of them exhibit interesting structural and physical properties like ferro-electricity, ferro-elasticity and low dimensional magnetism [1-10].

Synthesis,X-ray powder and Raman description are reported for $[N(CH_3)_4]_2CoCl_2Br_2$ compound. The calorimetric study shows three endothermic picks at 289 K, 323 K and 408 K. The compound crystallizes in the orthorhombic system, space group Pnma with a = 12.384Å, b = 9.058Å and c = 15.647Å. The dielectric spectra were measured in the frequency range 10^{-1}–10^{6}Hz and temperature interval from 200K to 305K. The dielectric permittivity shows that this compound exhibits a ferroelectric–paraelectric phase transition at 290K. The frequency dependent permittivity is interpreted in the non-Debye model. The temperature dependence of the low frequency limit of the bulk ac conductivity σ_{dc} is well described by the Arrhenius equation: $\sigma_{dc}= \sigma_o exp(-E_a/kT)$.

***Keywords**:calorimetric study, dielectric permittivity, ac conductivity.*

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PA3
Dielectric and Electric Studies of a New Ferroelectric Compound at Low Temperature

K. KAROUI, A. BEN RHAIEMH, F. HLEL, and K. GUIDARA
Laboratoire de L'Etat Solide, University of Sfax-TUNISIA, Faculty of sciences.
TUNISIA, Faculty of sciences.
kamelguidara@yahoo.fr

The $[N(CH_3)_4][N(C_2H_5)_4]ZnCl_4$ compound was prepared by a solution-based chemical method. The dielectrically measurements were investigated in the temperature and frequency ranges 220-320 K,

10^{-1}-10^{6} Hz, respectively. The temperature dependence of the dielectric permittivity presents a prominent dielectric peak at T_c=268K which characterizes a ferroelectric-paraelectric phase transition. The two semi-circles observed in the complex impedance identify the presence of the grain interior and grain boundary contributions to the electrical response in the material. The frequency dependent conductivity is interpreted in term of Jonscher's law: $\sigma(\omega) = \sigma_{dc} + A\omega^{n}$. The modulus plots can be characterized by the empirical Kohlrausch–Williams–Watts (K.W.W.) function: $\phi\ (t) = exp\ [(-t/\tau)^{\beta}]$. The temperature dependenceof the alternative current conductivity, direct current conductivityand the relaxation frequency (f_p) indicate the presence of the ferroelectric–paraelectric phase transition observed with the DSC technique at 279K.

Keywords: *$[N(CH_3)_4][N(C_2H_5)_4]ZnCl_4$: ferroelectric, Equivalent circuit, Modulus complex and Conductivity.*

PA4
Electrical conductivity modeling of polypropylene composites filled with carbon black and acetylene black

Abdelhafid MERZOUKI, Naceredine HADDAOUI,
Laboratoire de Physico-Chimie des Hauts Polymères (LPCHP),
Département de Génie des Procédés, Faculté de Technologie,
Université Ferhat Abbas 19000 Sétif, Algeria
hafid.merzouki@gmail.com

Composites of polypropylene filled with Carbon Black or acetylene black at different concentrations were prepared by melt mixing followed by compression molding. The influences of filler type and filler concentration on the composites conductivity were studied. It was found that the percolation threshold is located at a lower concentration in composites filled with the acetylene black, than that of the composites filled with carbon black.Mamuny model gives a fairly good agreement in the evaluation of the conductivity of polymeric composites loaded with carbon black or acetylene black, beyond the percolation threshold.The Boltzman equation was adopted to develop a model that represents more faithfully all results obtained. The expressions of the electrical conductivity, calculated with the

model developed, are in good agreement with experimental results for the entire concentration range studied (before and after the percolation threshold) in linear or semi-logarithmic scale.

Keywords: *Conductive composite, conductivity, carbon black, acetylene black, polypropylene.*

PA5

Theoritical calculation constants for spectrophotometric studies of news complexorganometallics

K. BENTAYEB, N. TCHOUAR, S. AMARA, K. OUADAH and A. H. Al-TAIAR

U.S.T.Oran, Department of Chemistry, Faculty of Science, Laboratory of Modelisation & optimization of industrial systems (LAMOSI)
Oran, Algeria
k_bentayeb@yahoo.fr

Using UV-visible spectrometric an electron donor-acceptor complex has been studied in this work. This complex was obtained using phenylhydrazine, diethylamine, ethyldiamine, benzylamine, azobenzol, benzamideas an electron donor with Ferric (III) ion as an electron acceptor in methanol at 25°C. The values of formation constant (K^{AD}), molar extinction coefficient (ε^{AD}), and absorption band energy of charge transfer complexes were estimated. The ionization potential of the donors, I^{D}, was calculated from the complex bands energy. The kinetics of the above association and reverse reactions was studied and some kinetic parameters were calculated.

Keywords: *UV-visible spectrophotometry, charge transfer complex, Scott equations,association constant, molar extinction coeffcient*

PA6

Polarization and Strain phenomena in uni-axially stretched β-form Polyvinylidene fluoride at low frequency electric field: experiments and modeling

BELOUADAH Rabah[1], GUYOMAR Daneil[2], BELDJOUDI Nadir[3].

[1] *Département de physique, Université de M'sila, PB 116 Ichebilia - M'sila Algérie.* ***r_belouadah74@yahoo.fr***

[2]Laboratoire de Génie Electrique et de Ferroélectricité, Institut National des Sciences Appliquées de Lyon, 8 rue de la Physique, 69621 Villeurbanne Cedex, France.
[3] Laboratoire de physique théorique, USTHB Alger.

The study of the electric field-induced thickness strain of ferroelectric polymers is very interesting because of their high actuating capabilities and various applications; as electroactive materials for artificial muscles or as active materials of membranes, due to their flexibility.This paper reports the effect of quasi-static triangular applied electric field E (100 mHz, on the strain properties of uni-axially stretched β-form Polyvinylidene fluoride (PVDF).For this level of applied electrical field, the strain is proportional to the square of the electric field. The strain is mainly due to the electrostriction effect, linked to the induced reversal polarization and to the interlaminar charges.This paper presents a new model, based on equivalent electrical circuit (capacitance, resistance …), which has been developed to evaluate the induced electric current and strain phenomenon. A good agreement between simulations and experimental results was obtained.

Keywords:*PVDF, piezoelectricity, electroactive polymers, electrostriction, ferroelectric polymers.*

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PA7

VALORISATION D'UN DECHET NATUREL LIGNOCELLULOSIQUE DANS L'ELIMINATION DE L'ARSENIC (III) DE L'EAU

NOUACER Sana, HAZOURLI Sabir, KHELAIFIA F/Zohra, ZIATI Mounir
Laboratoire de Traitement des Eaux et Valorisation des Déchets industriels (LTEVDI), Département de Chimie, Université Badji-Mokhtar, BP 12, Annaba, 23000, Algérie.

sanachimie@gmail.com

L'arsenic est un élément toxique qui se trouve en traces dans le sol et l'eau. Il constitue une menace potentielle pour l'homme et les micro-organismes utiles. Les pays asiatiques comme l'Inde, la Chine et le Bengladech sont les plus touchés. De nombreux traitements ont été développés pour l'élimination de l'arsenic de l'eau contaminée, mais leurs applications in-situ n'est pas toujours facile, en raison de leur rendement, de l'optimisation nécessaire à leur mise en oeuvre ou de leur coût, qui pose problème aux industriels qui sont en recherche permanente d'adsorbants bon marché. L'objectif de la présente étude est de valoriser des matériaux locaux en l'occurrence les tiges de palmiers, dans l'élimination de l'arsenic. Plusieurs influences ont été examinées pour optimiser le procédé testé. La caractérisation des tiges de palmiers a montré la possibilité de sa valorisation en matériau adsorbant. Les différents essais d'optimisation : de la concentration initiale en As(III) (50 à 150 ppm), de temps de contact (0 à 120 min), de pH (1 à 11), de granulométrie (0,2 à 1,25) et de température (10 à 40°C) ont permis d'obtenir en milieu basique, un maximum d'élimination de As(III) de l'eau, de l'ordre de 92%.

Mots clés :*Déchets Naturels –Tiges de Palmiers –Arsenic –Adsorption.*

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PA8
L'effet de la dispersion chromatique dans la transmission optique

KHERIS.S[1]. BOUABDALA. B[2]. MANSOURI.S[3].BOURZIK.A[4].
Université de Sidi Bel Abbés. Département d'Electronique
[1]*université de chlef, Algérie*
karima_kh5@yahoo.fr
[2]*Eunivercité de sidi bel abbés, Algérie*

La dispersion chromatique est un facteur majeur de limitation des performances des systèmes de transmission sur fibre à haut débit. Car le milieu des télécommunications utilise principalement des longueurs d'onde autour de 1,55μm (en raison de la faible atténuation de la fibre dans cette plage spectrale). Aussi, plus les débits à transmettre seront élevés, plus le recouvrement peut se produire rapidement, et plus des techniques de compensation élaborées devront être mises en œuvre. Il y a principalement deux possibilités : utiliser des fibres ayant la dispersion chromatique modifiée quasiment nulle pour cette longueur d'onde (mais au détriment de l'affaiblissement ou autres paramètres) ou ajouter à la première fibre ayant une dispersion chromatique positive une seconde fibre à dispersion négative. On parle de compensation de dispersion. Dans notre étude, nous effectuerons des simulations analyse de l'influence de la dispersion chromatique sur le signal transmis.

Mots clés: *Emetteur optique (diode laser), Récepteur optique (photo diode), Dispersion chromatique, multiplexeur longueur d'onde (WDM).*

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PA9

Synthesis and single crystal structure determinationof dipotassium trisodium triphosphate $K_2Na_3P_3O_{10}$

M.MOUTATAOUIA,[a] M.LAMIRE,[a] M.SAADI[b] and L.EL AMMARI[b]

[a]Laboratoire de Physico-Chimie des Matériaux Inorganiques, Faculté des Sciences Aïn Chock, Casablanca, Morocco.,
[b]Laboratoire de Chimie du Solide Appliquée, Faculté des Sciences, Université Mohammed V-Agdal, Avenue Ibn Batouta, BP 1014, Rabat, Morocco.

moutataouia_meryem@yahoo.fr

The title compound crystallizes in the monoclinic space group C2/c with a= 9.8866(4) Å, b= 5.6332(2) Å, c = 18.6577(8) Å, β = 96.199(3)°, Z = 4. For a single-crystal structure determination, 85 variable parameters were refined to R = 0.032, Rw = 0.079 using 2136 X-ray unique reflections.

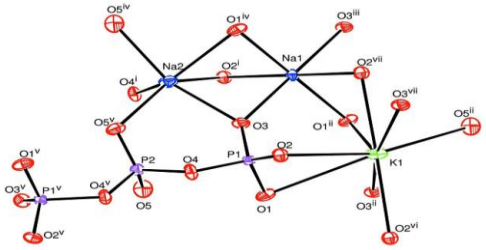

Figure 1: Plot of $K_2Na_3P_3O_{10}$ crystal structure showing polyhedra linkage. Displacement ellipsoids are drawn at the 50% probability level.

The structure of this compound consists of open chains of three PO_4 tetrahedra linked by single oxygen bridges . The values of P--P (2.883Å) distances and P-O-P (125.25°) angles are within the limits generally observed in condensed phosphate crystal chemistry. The internal symmetry of the P_30_{10} groups has a twofold symmetry, with the central phosphorus P2 atom being located on a binary axis. Moreover, the Na2 sodium ion lies on the symmetry center whereas all the remaining atoms are in general positions of the C2/c space group. The Na2 sodium atom located at Wyckoff position 4c (1/4, 3/4, 1/2) could be surrounded by a roughly octahedral arrangement of six oxygen atoms and the other sodium and potassium (Na1, K1) atoms are coordinated to six and eight oxygen atoms respectively. The $Na(2)O_6$ octahedra, $Na(1)O_6$ and $K(1)O_8$ polyhedra are connected

through the apices to triphosphate groups and form a three-dimensional host lattice (figure 1).This framework presents intersecting tunnels running along the [010] and [110] directions, where the $Na(1)^+$ cations are located (figure 2). The structure of this compound is isotype to that of $Na_5P_3O_{10}$ phase I.

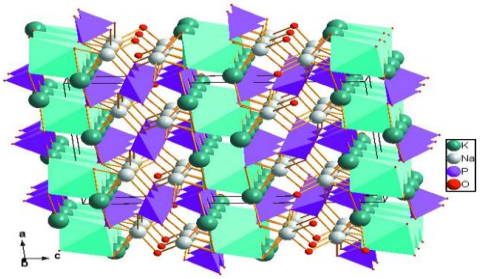

Figure 2 : Projection view of the $K_2Na_3P_3O_{10}$

Keywords: *phosphate, crystal structure, single-crystal X-ray study*

PA10
Theoretical analysis of the effective masses, bonding and optical properties of zinc-blende Cadmium chalcogenides

S. OUENDADJI [1], S. GHEMID[1], H. MERADJI[1], F. EL HAJ HASSAN[*,2, 3]

[1]Laboratoire de Physique des Rayonnements, Département de Physique, Faculté des Sciences, Université de Annaba, Algeria.
ouendadji@yahoo.fr
[2] Université Libanaise, Faculté des Sciences I, Laboratoire de Physique des Matériaux, El-Hadath, Beirut, Lebanon.
3 Condensed Matter Section, The Abdus Salam International Centre for Theoretical Physics (ICTP), Strada Costiera 11, 34014 Trieste, Italy.

We present the results of density functional calculations to study the electronic structures and the effective masses for II-VI zinc-blende wide band gap semiconductor compounds by computing the curvature of the principal band extrema at the point. We also calculated the optical properties of the technologically important,using the full potential linearized augmented plane wave method within the (GGA) approximation .Our

calculations were performed to evaluate the dielectric function (realand imaginary parts),and the loss function of the II–VI semiconductors. Also the refractive index and the extinction coefficient are all studied. Detailed comparisions are made with published experimental and theoretical data and show generally good agreement. The present results regarding the studied quantities are predictions and may serve as reference for experimental work.

Keywords:*FP-LAPW, DFT, cadmium chalcogenides, effective masses, optical properties.*

PA11

Behavior of materialsBN, BPandBAsin the different phasesofzinc blende, NaCl andCsCl

BENCHERIF Kaddour [1], YAKOUBI Abdelkader 2, LOUHIBI Mohamed Elhadi 3

[1]Center University of Ain Témouichent, 46000, ALGERIA

bencherifeim@gmailcom

[2]Laboratory of the Simulation and Modelisation of the Sciences Materials University of Sidi Bel Abbes, 22000, ALGERIA

[3]Intelligent Control & Electrical Power Systems Laboratory, University of Sidi Bel Abbes, 22000, ALGERIA

In this work we used the first ab-initio calculations to study the stability of the binary alloys[1] BN, BP and BAs and their behavior in the different phases[2] of zinc-blende, Nacl and CsCl .The full potential linearized augmented plane wave (FP-LAPW) method was employed within density functional theory (DFT)[3]. Our results show the difference in the calculated structural properties and the band structure is obtained for the zinc-blende structure[4]. We have investigated the lattice parameters and band gap energies. We also give the valence charge density at a high pressure and states density[5].

Keywords: *Binary alloys, ab initio calculations (FPLAPW), Lattice parameter, high pressure,band- structure, charge density, states density.*

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PA12

Polarization phenomena (EP) and (dc) conductivity in piperidinium ionic liquids ILs using Dielectric Relaxation Spectroscopy

Boumediene HADDAD[a,b], Didier VILLEMIN[b], El-habib BELARBI[a], Mustapha RAHMOUNI [a]

[a] *Department of Chemistry, Synthesis and Catalysis Laboratory LSCT, Tiaret University, Tiaret, Algeria*

[b] *LCMT, ENSICAEN, UMR 6507 CNRS, University of Caen, 6 bd Ml Juin, 14050 Caen, France*

haddadboumediene@yahoo.com

In this work, new dicationic Ionic liquids based on piperidinium cations combined with different anions such as, [PF_6^-], [BF_4^-]and [NTf_2^-] have been synthesized and characterized by using ^1H, ^{13}C, ^{19}F, ^{31}P NMR and FT-IR spectroscopy. Using differential scanning calorimetry (DSC), their thermal property as; Glass transition temperature (T_g), Melting point (T_m) and decomposition temperature (T_d) were measured and investigated in detail.

The dielectric properties of obtained products were measured by impedance spectroscopy in the frequency range from (10^{-2} to 10^6 Hz) and over the temperature range near glass transition (T_g). Dielectric data were analyzed using complex permittivity (ε*) and complex electrical modulus (M*) for the ILs samples at various temperatures. The evolution of the complex permittivity (ε',ε'') as a function of frequency and temperature was investigated.

The large values of the permittivity obtained in the low frequency range, are attributed to the electrode polarization phenomenon occurring as a result of an ions accumulation near the electrodes. At low frequency the dispersion was investigated in terms of dielectric loss tan(δ). Also, in order to understand the ion dynamics in our ILs, the frequency dependence of the complex conductivity (σ′, σ′′) at various temperatures has been analyzed. The relaxation has been characterized by the empirical Havriliak–Negami (H-N) equation. The temperature dependence of the relaxation times was shown to be governed by the Arrhenius for [PF_6^-] ILs and by a Vogel-Fulcher-Tammann equation for [BF_4^-] and [NTf_2^-] respectively.

Keywords*: Ionic liquids ILs; Differential Scanning Calorimetry (DSC); Dielectric relaxation spectroscopy (DRS); electrode polarization phenomenon; Conductivity.*

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PA13

Optimisation des Paramètres d'un Séparateur Electrostatique en Utilisant les Réseaux de Neurones

S.TOUHAMI[1] , K.MEDLES[1], O.DAHOU[1], A.TILMATINE[2], L. DASCALESCU[3]

[1]Electrostatics and High Voltage Research Unit IRECOM, University Djillali Liabès Sidi Bel Abbès, ALGERIA

kmedles1972@yahoo.fr

[2]APELEC Laboratory, Faculty of Technology, Djillali Liabes University Sidi-Bel-Abbes, ALGERIA

[3]PPRIME Institute, UPR 3346, CNRS - University of Poitiers - ENSMA, IUT, Angoulême 16021, FRANCE

Le travail consiste à la mise au point d'une procédure de contrôle optimal du processus de séparation électrostatique en utilisant les réseaux de neurones. La cible était la maximisation du produit isolant, les variables de contrôle étant la haute tension d'alimentation du système d'électrodes, et la vitesse de rotation du cylindre tournant. L'efficacité de la procédure est testée par rapport à une situation de disfonctionnement qui peut arriver dans la pratique industrielle : une variation du débit du produit introduit dans le séparateur électrostatique.

Mots clés : *séparation électrostatique, réseaux neurologiques artificiels, algorithmes génétiques.*

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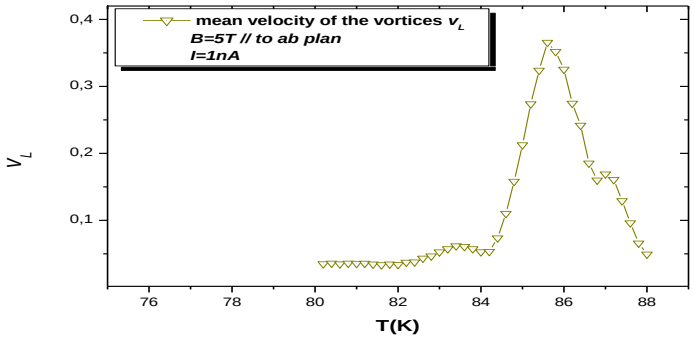
PA14
The vortex matter investigation in YBCO type II superconductor

M. BGHOUR, A. TAOUFIK, A. LABRAG, A. BOUAADDI, H. ELHAMIDI, B. LMOUDEN, A. HAFID
Département de physique, Faculté des sciences, Université Ibn Zohr, Agadir Morocco
bghourmustapha@yahoo.fr

The exploitation of type II superconductors has increasingly attracted the attention of scientists as well as the industrials. In fact, such materials have exhibited since their discovery a variety of exciting properties; for instance one can state the important values of the magnetic field that can be generated by those materials. The dc or ac current that can be carried by those superconductors in the practical situation is also very exciting. However, the existence of a very small resistivity can never be avoided in this case. The mentioned resistivity is a direct consequence of the flow of vortices entities generated in type II superconductors whenever they carry a transport current. The investigation of the dynamic of vortices in HTc superconductors continues to attract more and more attention of researches in the field of superconductivity. Many attempts [1~3] to understand the mechanism responsible of the kinetics of such systems did not lead right now to satisfaction. In this regard, we tried in our work to use the noise measurements which consist a very valuable technique to investigate the vortices behaviour in superconducting materials [4]. Our main finding can be

summarized as follows: the calculation of the time transit and then the vortices mean velocity in our samples show that the shot noise model can explain qualitatively our results. Nevertheless when we estimated the power spectral density noise $S_V(T)$ as it is suggested by this model, we find out that there is a very large discrepancy between experimental and theoretical results in spite of the qualitative agreement between the two results. We concluded that the shot noise model can explain the noise shape of our samples but seems to be incapable to describe the results quantitatively [5].



***Keywords**:Vortices,voltage noise, phase transition, shot noise*

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PA15

Durcissement Structural Des Alliages à Base du Plomb Pour Les Grilles de Batterie

Rachid KIDARI[1], Youssef AIT YASSINE[1], Elhassan ZANTALLA[1], Abdellah AGUIZIR[1],Jamaa ICHE[1], Saad ELMADANI[2,] Najim SELHAOUI[1], Lahcen. BOUIRDEN[1]
[(1)]Laboratoire de Thermodynamique et Energétique, Faculté des Sciences, BP 8106. Agadir, Maroc
rachidkidari@gmail.com

(2)Laboratoire Physico-chimie des Procédés et des Matériaux,
Université Hassan 1er FST Settat, Maroc

L'étude systématique des mécanismes du durcissement structural des solutions solides sursaturées des alliages PbCd à été déjà réalisée par Hilali et al. [1,2]. L'évolution de la structure de trempe de ces alliages vers l'état d'équilibre se fait en deux stades dont les forces motrices proviennent principalement de la sursaturation de la matrice en cadmium. Le premier stade, appelé vieillissement, se fait en deux étapes concomitantes. La première correspond à une transformation discontinue partielle adoucissante, la deuxième est une précipitation continue durcissante. Pendant le premier stade, le degré de variation de la dureté dépend essentiellement de la transformation dominante. Le deuxième stade se manifeste après vieillissement par une reprécipitation discontinue lamellaire de la même phase Cd. Cette précipitation est associée à un grossissement de précipités entraînant un adoucissement caractérisant le survieillissement. Par ailleurs, dans le but d'améliorer davantage les performances des grilles de batteries au plomb, nous avons entrepris l'étude des mécanismes de durcissement structural des alliages de plomb microalliés au cadmium et en aluminium (PbCdAl). Ce qui correspond à une étude systématique des processus de vieillissement et de survieillissement des solutions solides sursaturées de ces alliages par différentes techniques : la dureté, la microdureté, la microscopie optique et la microscopie électronique à balayage.Notre consiste à étudier l'influence des ajouts mineurs d'Aluminium sur les mécanismes de durcissement structural des alliages Plomb-Cadmium. Deux états structuraux sont considérés : alliage brut de coulée et alliage réhomogénéisé. Les températures explorées sont essentiellement 20 et 80 °C. Cette dernière température est choisie parce qu'elle correspond à la température de murissage des plaques des batteries ainsi qu'à la température extrême de son fonctionnement. Le teneur de Cadmium est de 2% en poids et le teneur d'Aluminium sont de 0,068% et 0,085% en poids.

Mots clés:*Plonb, Dureté, Précipitation continue, Transformation discontinue, Vieillissement.*

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PA16
Elaboration de couches minces d'oxyde de bismuth Bi_2O_3

N. HAMDADOU, S. BELHAMRI, F. KHENATCHA, M. BOUHMIDI
Laboratoire de Micro et de Nanophysique (LaMiN), ENSET-Oran, BP 1523 El Mnaouer 31000, Oran, ALGERIE
nhamdadou@gmail.com

Le trioxyde de bismuth Bi_2O_3 est un oxyde transparent conducteur (OTC), présentant des propriétés optoélectroniques intéressantes pour le domaine des capteurs de gaz et les applications photovoltaïques [1-3]. Son utilisation comme couche transparente dans les cellules solaire est envisageable. Des couches minces polycristallines de Bi_2O_3 sur substrats de verre ont été préparées. L'élaboration est établie par la technique de pulvérisation chimique réactive en phase liquide (spray pyrolyses). La solution chimique utilisée était à base de nitrate de bismuth [$Bi(NO_3)_3.5H_2O$] et d'eau déionisée. La température des substrats était de 250°C, la pulvérisation est établie sur 20 cycles d'une durée de 15s pour chaque cycle, des temps d'arrêt de 30s ont été marqués entre les cycles afin d'éviter les grandes fluctuations de la température. Des traitements thermiques des couches obtenues ont été faits à 300°C, 400°C et 500°C pour une durée de 3 heures.L'analyse par la diffraction des rayons X, révèle que les couches n'ayant pas subi de traitement thermique et les couches recuites à 300°C pendant 3h, étaient formées de la phase $Bi_{24}Cl_{10}O_{31}$ et cristallisaient dans la structure monoclinique avec les paramètres de réseau: a=9.995 Å, b=3.969 Å, c=29.44 Å, β=88.7°**.**

Les couches minces recuites à 400°C étaient celles de β-Bi_2O_3 avec la structure tétragonale, les paramètres de réseaux déduits étaient les suivant: a=10.93 Å, c=5.62 Å. Cependant les couches ayant subies un recuit de 500°C pendant 3 heures étaient formées d'une phase cristalline différente de Bi_2O_3, c'est la phase γ-Bi_2O_3, de structure cubique centrée, avec un paramètre de réseau a=10.25 Å.

***Mots clés**: couche mince, Bi_2O_3, spray pyrolyses, DRX.*

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PA17

Effet de la réduction de la surface du lit fluidisé et les parois sur le rendement d'un pilote industriel de séparation tribo-Aéro-électrostatique

Mohamed MILOUDI[1], Karim MEDLES[1], Abdelber BENDAOUD[1], Amar TILMATINE[1], Lucian DASCALESCU[2],
[1]Electrostatics and High-Voltage Research Unit, IRECOM, University "Djillali Liabes",
22000 Sidi-Bel-Abbès, Algeria
[2]PPRIME Institute, UPR 3346, CNRS - University of Poitiers – ENSMA, IUT, 4 avenue de Varsovie, 16021 Angoulême, France
miloudi.mohamed67@gmail.com

L'amélioration du rendement des installations de séparation électrostatique est très convoitée pour des raisons économiques et aussi pour la protection de l'environnement des déchets des équipements électriques et informatiques dont les quantités ne cessent d'accroître d'année en année. L'objectif du présent article est le développement d'un pilote industrielle de séparation tribo-Aéro-statique à bandes transporteuses conductrices pour la récupération de matériaux granulaires isolants dans un lit fluidisé. Le mélange à séparer est composé de l'acrylonitrile-butadiène-styrène (ABS) et le polystyrène choc (HIPS) de taille 2 mm provenant du recyclage des déchets d'équipements électriques et électroniques. Une série d'expériences menées pour deux surfaces du lit fluidisé (42cmx15cm et 30cmx15cm) dans des conditions ambiantes de température et (T=18°C ; RH=40%) ±1), il est à souligner que la séparation devient très efficace pour un lit de fluidisation de surface réduite ou l'accroissement de la masse en pourcent excède en moyenne les 52% pour l'ABS et un peu plus de 14% pour le HIPS et que le rôle des parois latéraux en PMMA (plexiglas) ou en Acétate dans la chambre

de fluidisation, est prépondérant sur la récupération des produits purs, la première (PMMA) favorise l'ABS et la seconde (Acétate) augmente la quantité de HIPS.

Mots clés :*Triboélectricité, les champs électriques, les procédés de séparation électrostatiques, des mesures électrostatiques.*

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PA18

XRD and MEB studies of iron selenideprepared by mechano-synthesis

A.CHEBLI[1-2], A. DJEKOUN[2], N. BOUDINAR[2], A. OTMANI[2], B. BOUZABATA[2], J. M. GRENECHE[3], K. TAIBI[4]

[1] Ecole préparatoire aux sciences et techniques d'Alger BP 474 Place des Martyrs –Alger

[2]Laboratoire de Magnétisme et de Spectroscopie des Solides Université Badji Mokhtar

Faculté des sciences B. P: 12 (23000) ANNABA –Algérie

[3]Laboratoire de Physique de l'Etat Condensé, UMR CNRS 6087 Université du Maine

Faculté des Sciences 72085 LEMANS Cedex 9 –France

[4]Laboratoire Sciences et de Génie des Matériaux, Université des Science et de la technologie Houari Boumediene Faculté des Génie mécanique et Génie de Procédés, Alger –Algérie

ch_k212002@yahoo.fr

The Fe–Se compounds, such as FeSe, $FeSe_2$, and Fe_7Se_8, etc. [1–4], are important family of Se-based materials. Fe–Se compound attracts more andmore attention because mostof them show ferromagnetism. They are expected to be utilized as interlayer for semiconductor/ferromagnetic metal hetero-structures, or as promising magnetic material Mechanical alloying (MA) is a powerful technique to synthe-size nanostructured powdered materials, providing that the experimental milling conditions are very well defined. It can also be used to produce non-equilibrium structures such as solid solutions of immiscible systems, extended solid solutions, quasi-crystalline and amorphous materials;This work deals with the microstructural properties of the Fe–75Se alloy prepared by ball milling of elemental iron and selenium powders. The obtained mixed powder has been characterized by means of scanning electron microscope and X-ray diffraction . X-ray line profile analysis based on the Rietveld method and adopting two different models has been used for the microstructural study. The refinement of the X-ray patterns shows that after 10 h of high energy milling the $FeSe_2$ and α-FeSetetragonal phase is formed. for 52 h of milling, the XRD pattern showed the coexistence of $FeSe_2$,α-FeSe and Fe_7Se_8.

Keywords: *Alloy FeSe, nanostructured materials, X-ray diffraction .*

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PA19

Hopping and magnetotransport in granular perovskite oxides $La_{0.67}Ca_{0.33}MnO_3$ and $La_{0.5}Sr_{0.5}CoO_3$

A.NARJIS *, A. EL KAAOUACHI, M. ERRAI, E. DAOUDI, A. SYBOUS,
S. DLIMI, L. LIMOUNY
Research Group « Equipe de Semiconducteurs, de Nanotechnologie et de Programmation Scientifique », Physics department, University Ibn

Zohr, Faculty of Sciences, B.P 8106, Hay Dakhla, 80000 Agadir, Morocco.
narjis78@gmail.com

Electrical transport is studied in nanocrystals of $La_{0.67}Sr_{0.33}MnO_3$ (LCMO) and $La_{0.5}Sr_{0.5}CoO_3$ (LSCO) in the temperature range 0.4-5 K. In both samples, two distinct behaviors of the conductivity are observed. In LCMO sample, the Variable Range Hopping regime is observed for T>1 K with enhancement of the relative permittivity. On contrary, for LSCO sample, there is no latitude at all that could allow the possibility of this model being valid. For T<1 K, the transport model in both samples is considered in the two component model of metallic-like droplets embedded in dielectric matrix where the negative magnetoresistance can be explained by considering the Spin Polarization Tunneling phenomenon in the intergranular regions.

Keywords: *Manganites, Variable Range Hopping, Negative Magnetoresistance, Low Temperature*

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PA20
Synthesis, and characterization of new materials compounds based on Lanthanide

Meriem BENSLIMANE[a], Ouahida ZEGHOUAN[a,b], Hocine MERAZIG [a], Jean-Claude DARAN[c]

(a) URCHEMS, Université Mentouri Constantine, 25000 Constantine, Algérie,
b_meriem80@yahoo.fr

(b) Centre de recherche en biotechnologie, nouvelle Ali mendjeli Constantine. Algérie,
zeghouanouahida@yahoo.fr

(c) Laboratoire de Chimie de Coordination, UPR-CNRS 8241, 205 route de Narbonne, 31077 Toulouse Cedex 4, France,
Jean-Claude.Daran@lcc-toulouse.fr

Organic-inorganic hybrid compounds are of great interest because of their special magnetic[1], electronic[2] and optoelectronic properties[3]. It is expected that the packing interactions that govern the crystal organization will be influenced by the features of the cations and anions, which in turn will affect specific properties of the solids.The title compound is part of a series of lanthanide complexes with the organic cation 4-(dimethylamino)pyridinium, for example: $(C_7H_{10}N_2)_2[LaCl(H_2O)_8],Cl_4,3H_2O$ **(I)**; $(C_7H_{10}N_2)$ $[Er(H_2O)_8],Cl_4,H_2O$ **(II)** and $(C_7H_{10}N_2)_3[Nd_2Cl_4(H_2O)_{10}],Cl_5,2H_2O$ **(III)**. In the three compounds, (I)-(III), there is a decrease in the bond lengths of the metal-O(water) bonds, from 2.5101 (15)-2.5632 (15)Å in (I), 2.404 (3)-2.479 (4) Å in (II) and 2.2989 (15) - 2.3807(15) Å in (III). This trend corresponds to the decreasing metallic radius of the lanthanide ion involved; La^{3+}, Nd^{3+} and Er^{3+}, respectively. In addition, the 4-(dimethylamino)pyridinium cation in the three compounds is protonated at the pyridine N atom. The N-C bond linking the dimethylamino substituent to the pyridinium ring is short, 1.321(3), 1.324(3)Å for (I), 1.330 (5), 1.2855 (2) Å for (II) and 1.331 (3) Å for (III), suggesting some delocalization in the cation. The dimethylamino group lies close to the plane of the pyridinium ring, with dihedral angles of 3.5 (3) and 2.0 (3)° for (I), 1.6 (6)° and 6.5 (3)° for (II) and 4.5 (3)° for (III). On the structural level the atomic arrangement in all three compounds, (I)-(III), consists of networks of alternating organic–inorganic layers. The chloride anions are located between these entities forming hydrogen bonds with the NH atoms of the 4-

(dimethylamino)pyridinium cations and the water molecules. There are also C—H…Cl interactions present involving one of the 4-(dimethylamino)pyridinium cations. The result is the formation of three-dimensiona supramolecular architectures.

Keywords: *Lanthanide , hybrid compounds, X-ray Diffraction.*

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PA21

Characterization OF Deformation Texture OF Copper Wire (99.26% Cu) Drawn Destined For Electrical Cabling

M. ZIDANI[1], F. DENDOUGA [1], S. MESSAOUDI[1], T.BAUDIN[2,3], C. DERFOUF[1], A. BOULAGROUN[1] and A.L. HELBERT[2,3]

[1] Laboratoire de Génie Energétique et Matériaux, Université de Biskra, - BP : 145 - Biskra- 07000 Algérie

[2]CNRS, UMR8182, ICMMO, Laboratoire de Physico-chimie de l'Etat Solide, Orsay, F-91405, France

[3]Univ Paris Sud, Orsay, F-91405, France

zidani.sabih@gmail.com

In this research we studied the evolution of deformation texture during drawing of copper wire destined for the electrical cabling and understand its link with mechanical and electrical properties. It was observed that the cold drawing causes a crystallographic anisotropy and elongation of grains along the axis of drawing. The texture is composed mainly of fiber <111> / / DN (DN / / drawing axis) (majority) and fiber <001> / / DN (minority). Fiber <001> / / ND consists of a reinforcing {001} <110> which is associated with the component {001} <120>. Moreover, we observe that the fiber <111> / / DN consists of a principal reinforcement {111} <112> . On the other hand we noted an increase in hardness, mechanical resistance and electrical resistivity of wire drawn with the deformation level by wiredrawing [1-4].

Keywords**:** *Cold wire drawn, , Microstructure, Texture, Hardness, Electrical resistivity, Mechanical resistance, Fiber, Deformation.*

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PA22
Modélisation et caractérisation des céramiques à base d'Alumine

Z. BOUMOUS[1],S. BOUMOUS[1], S. BELKHIAT[2]
[1]*LEER Laboratory, Mohamed cherif Messaidia University Souk Ahras, 41000, Algeria*
zsid3@yahoo.fr
[1,2]*DACHR Laboratory, Ferhat Abbas University , Setif, 19000, Algeria*

L'alumine est un terme générique donné aux oxydes d'aluminium de formulechimique Al_2O_3. En plus de leurs différents types de cristallographie, les alumines métastables peuvent être également divisées en deux catégories dans lesquelles l'arrangement des anions oxygène sont dans une structure.Dans le présent article, nous avons présenté une caractérisation électrique et thermique des échantillons en Alumine 96% et 99,6% .Une méthode numérique a été utilisé pour la résolution de l'équation de diffusion de chaleur sur des substrats d'Alumine en unidimensionnel ; les résultats de simulation ont été validé et comparé avec ceux obtenus expérimentalement par la méthode de l'onde thermique alternative.

***Keywords**: MOTA, MVF, Al2O3, céramique, permittivité*

PA23
Modelling the distribution of traps in LiF by Thermoluminescence

[1]Mokhtar HALIMI, Ahmed KADARI, Dahane KADRI.
Laboratoire de Microscopie Électronique et Sciences des Matériaux (LMESM) Université des sciences et de la technologie Mouhamed Boudiaf BP 1505 El M'Naouer 31000 Oran, Algérie
halimimokhtar@yahoo.fr

The objective of this work is to construct a mathematical model to explain the distribution of trap levels in the LiF material, using the technique of thermoluminescence (TL), and based on thermoluminescence intensity curves (curve I-TL) of LiF used in the literature. In this study we try to see the influence of irradiation dose on the behavior of LiF thermoluminescence and on the kinetic parameters of thermoluminescent peaks corresponding.

Keywords: *Thermoluminescence, LiF, point defects, irradiation dose, kinetic parameters.*

PA24
Study of the effective masse and Landé g factor near the critical density in 2D Si-MOSFETs

L. LIMOUNY[a],*, A. EL KAAOUACHI [a], G. BISKUPSKI[b], A. SYBOUS[a], S. DLIMI [a], A. NARJIS[a], M. ERRAI[a], E. DAOUDI[a].
[a] Research Group ESNPS, Physics Department, University Ibn Zohr, Faculty of Sciences, B.P 8106, Hay Dakhla, 80000 Agadir
fetoika@hotmail.com
[b] Laboratoire de Spectroscopie Hertzienne LSH, Bâtiment P5, Université des Sciences et Technologies de Lille I 59 655 Villeneuve d'Ascq Cedex France

We investigate the electrical resistivity and conductivity in presence and absence of a parallel magnetic field in dilute two dimensional electron system for sample Si-15 MOSFETs; We measured the effective masse and the Landé g factor near the Metal-Insulator Transition (MIT) and found the Landé g factor remains constant and close to its value in bulk silicon while we have observe a sharp increase of the effective masse near the critical density of the MIT.

Keyword*: 2D Si-MOFSETs, Metal-Insulator Transition, Effective masse, Landé factor, parallel magnetic field.*

PA25

Structural electronic and magnetic properties of perovskiteruthenate CaRuO3: Good candidate for the fabrication of superconducting multilayers

HADDAD Houari[1*], CHAHED Abbes[1], BENHELAL Omar[1] and LAKSARI Soraya[1].BOUGHERARA Kada[1]

[1] Modelling and Simulation in Materials Science Laboratory (LMSSM), Djillali Liabès University of Sidi Bel-Abbès, Algeria

houari.haddad@yahoo.fr

We study the two pseudo-cubic perovskite ruthenate $CaRuO_3$ by means of LSDA electronic structure calculations using the FP-LAPW method for the real orthorhombic structure in para-, ferro-, and A-, C-, and G-type antiferromagnetic configurations. The LSDA calculations predict that orthorhombic structure are ferromagnetic, with total magnetic moments of 1,9 μ_B. Our results are analyzed with the help of total, site-, spin-, and orbital-projected density of states. The general features of the DoS are in reasonable agreement with the experimental photoemission and other calculations. However, the fine details of the DoS of these structures are sharply peaked near the position of $\varepsilon_F$and this contributes to the high sensitivity of many of the calculated results as well as to strong variations of the properties of the real material. Our calculations show that the Ru *d eg*-like electrons are present in the whole valence-band region. Oxygen *2p*-derived states hybridize strongly with Ru *d* states in this compound, and O, through this hybridization, plays an unusually large role in the magnetic properties. This involvement of O is responsible for the colossal magnetoresistance (CMR) coupling that is found in the calculations. Magnetic moments are examples of quantities exhibiting strong variations, but the calculations clearly show that the orthorhombic distortion is favourable for large spin splitting and low conductivity. A gap structure in the majority band just above $\varepsilon_F$can be important for semi-metallic properties induced by distortions or charge transfers.

PA26
Synthesis Of Nanocomposites Based On Pyrrole And Its Derivatives By The Modified Clay

H. SOLTANI[1], A. BENYOUCEF[1], S. BOUSALEM[2]

[1]Laboratoire de chimie Organique, Macromoléculaire et des Matériaux (LCOMM), Université de Mascara, Faculté des Sciences et de la Technologie, BP 763 Mascara 29000, Algérie.

soltanihouari@gmail.com

[2]Centre Universitaire de Ain Temouchent. Inst. des Sciences et Technologies. Bp 214 Ain-Temouchent, Algerie.

Nanocomposites[1,2] based on polymer matrix and clay reinforcements have created a huge effort from academic and industrial researches[3]. These investments are recompensed by the significant amelioration of several properties in comparison to conventional composites. The present work is devoted to a key parameter which is the elaboration conditions. The conductive polymer nanocomposites are an emerging class of materials with promising properties they are based on the dispersion of nanometer clay layers within the matrix [1]. Polymer nanocomposites/clay modified was prepared by using two methods in situ polymerization and blending solutions. The objective of this study is to examine the effects of clay modified by compensating ions (Na^{+}, Cu^{2+}) on the formation of nanocomposite by different methods. Were obtained with a lamellar structure intercalated nanocomposites by in situ polymerization of the polymer among the layers of the modified clay. The synthesized productwere characterized using X-ray diffraction (XRD), X-ray fluorescence (XRF), the infrared (IR), ultra violet (UV) and cyclic voltammogram (CV).

Keywords: *Nanocomposites, PPy, PNMPy, Clay, Conductive polymer.*

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PA27

Etude expérimentale de l'influence de la discontinuité et de la non uniformité de la pollution sur la propagation des décharges électriques à la surface des isolateurs HT

Mohammed El Amine SLAMA[1], Abderrahmane BEROUAL[2] et Hocine HADI[1]

1Laboratoire de Génie Electrique d'Oran (LGEO), Groupe Haute Tension, Faculté de Génie Electrique,
Université des Sciences et de la Technologie d'Oran, Mohamed Boudiaf, USTO, BP1505, El Mnouar Oran, Algérie.
amineslama@yahoo.fr
2 Laboratoire AMPERE CNRS UMR 5005, Groupe Matériaux, Ecole Centrale de Lyon,
36 Avenue Guy de Collongue, 69134 Ecully, France.

L'étude du contournement des isolateurs pollués sous tension de chocs est d'un grand intérêt pour le dimensionnement de l'isolement dans les réseaux électriques. Aussi, les surtensions provoquées par ces chocs (chocs de foudre et chocs de manoeuvre), constitue la contrainte la plus sévère à laquelle sont exposés les réseaux d'énergie notamment à travers les remontées de potentiel des prises de terre des pylônes et des équipements des postes électriques. Ces remontées de potentiel ont pour effet immédiat le contournement des isolateurs même lorsque les degrés de pollution sont faibles.Plusieurs mécanismes ont été avancés pour interpréter le contournement des isolateurs sous chocs Impulsionnels mais aucun ne fait l'unanimité. Parmi les mécanismes proposés dans le cas des interfaces propres, on peut citer en particulier la distorsion et le renforcement du champ électrique local [1, 2], l'amplification des taux d'ionisation et d'attachement à l'interface gaz/surface [1, 3] et l'accumulation de charges surfaciques [4 - 6]. Les processus impliqués dans le développement de la décharge font encore l'objet de nombreuses études. Quant au cas des isolateurs pollués, les principales hypothèses avancées pour expliquer la dynamique de la décharge ont été faites pour des tensions continues ou des tensions alternatives dont les plus importantes sont : l'hypothèse de l'ionisation progressive [7], l'hypothèse de la rupture diélectrique [8], l'hypothèse de rupture électrique associée à l'ionisation progressive [9], l'hypothèse de la force thermique [10] et enfin l'hypothèse de la force électrostatique [11].D'autre part, l'étude des conditions critiques dans le cas d'une pollution discontinue est délicate et plus complexe alors que ce cas est plus représentatif de la distribution réelle de la pollution [12, 13]. Il existe peu de travaux sur la discontinuité non uniforme de la pollution.Ce travail s'intéresse à l'influence de la discontinuité non uniforme de la couche de pollution sur les grandeurs critiques du contournement. Notre choix s'est porté sur l'étude

d'une configuration de type deux bandes polluées et deux bandes sèches (2BP2BS). La non uniformité de la pollution se présente comme suit : une bande polluée avec un électrolyte de conductivité connue et une autre bande polluée avec de l'eau déminéralisée d'une conductivité résiduelle de 0,05 µS/cm. Les segments pollués sont séparés par une bande sèche de 1,0 cm de longueur. Les bandes polluées possèdent une longueur de fuite *L1* = *L2* = 4,5 cm. Cette situation est très représentative de ce qui se passe pour les isolateurs réels où la surface supérieure, bien qu'humidifiée, est peu conductrice, contrairement à la surface inférieure qui est beaucoup plus conductrice.Nous avons choisi d'étudier deux distributions de la pollution. Dans un premier cas, la bande polluée est du côté de la haute tension (HT) tandis que la bande humide est du côté de la masse (MA). Dans le second cas, nous avons inversé cette répartition : la bande humide est du côté HT tandis que la bande polluée est du côté de la masse.La caractérisation optique et électrique montre que l'amorçage des décharges a lieu au niveau des bandes sèches et que leur morphologie est fonction de la polarité de l'électrode HT. Les oscillogrammes des courants révèlent autant de sauts (paliers) que de bandes sèches. Le type de configuration de la pollution et la polarité ont une influence sur la valeur de l'intensité du courant et la durée du dernier palier ainsi que l'écart entre les grandeurs critiques. A partir de ces constatations, nous en déduisons que les variations de l'impédance linéique locale en amont de la décharge déterminent les conditions de propagation de chaque décharge. Par conséquent, les conditions de propagation des décharges sont locales et les paramètres caractéristiques de cette dernière varient selon la configuration de la pollution.

Mots clés : *Isolateur – décharge électrique – pollution- contournement – conditions critiques – condition de propagation.*

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PA28

Electronic parameters of CuO/p-Si diode and some properties of copper oxide films

Omer GULLU[1], Ibrahim Y. ERDOGAN[2], Sezai ASUBAY[3],Tahsin KILICOGLU[1], Abdulmecit TURUT[4]

[1]*Batman University, Physics Department, Batman, TR-72060, Turkey*

omergullu@gmail.com

[2]*Bingol University, Chemistry Department, Bingol, TR-12000, Turkey*

[3]*Dicle University, Physics Department, Diyarbakir TR-21000, Turkey*

[4]*Istanbul Medeniyet University, Physics Eng. Department, Istanbul, TR-34000, Turkey*

In many advanced technological applications such as solar cells, gas detectors, transparent electrodes and other electro-optic devices, the

extensive use of transparent conductive oxides has raised to intense investigation of their chemical/physical/optoelectronic nature[1]. These materials are crystalline and catalytically active, which change their resistance due to electron transfer between the measured gas and the sensing material, as a consequence of surface chemical reactions at operating temperatures[2]. Among these materials, CuO is a promising semiconductor material for solar cell fabrication due to its suitable optical properties[3]. Furthermore, it is attractive as a selective solar absorber since it has a high solar absorbency and a low thermal emittance. An important advantage of CuO in device applications is that it is non-toxic and its constituents are available in abundance[3].

There has been considerable interest in the experimental studies of metal-semiconductor (MS), metal-interlayer-semiconductor (MIS) type Schottky diodes in the past decades[3]. Performance and reliability of these devices are especially dependent on the formation of interlayer, and they strongly influence the device parameters, such as the interface states density, barrier height and ideality factor[3]. Here, optical and structural properties of CuO films deposited on p-Si substrates by spin coating method have been investigated by UV-Vis spectroscopy, FTIR spectroscopy, PL spectroscopy and XRD method. Also,we have studied the electrical properties of the Au/CuO/p-Si MIS diode structure.

***Keywords**: Copper oxide,diode, p-Si*

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PA29

EFFECT OF THE DIMER FIBONACCI ON TRANSMISSION PROPERTIES IN GaAs/$Ga_{1-X}Al_XAs$ SUPERLATTICES

AZIZ Zoubir* , SEFIR Yamina, DJELTI Radouan and BOUADJEMI Bouabdellah

Laboratory of material valorizations, Faculty of Sciences and Technologie, Abdelhamid Ibn Badis Mostaganem University, BO 227, 27000 Algeria
*E-mail**: aziz_zdz@yahoo.fr***

The transmission coefficient is numerically evaluated for applied tensions with Dimer Fibonacci Height.
Barrier Super lattices structures using exact Airy function formalism and the transfer-matrix technique
We show that the fractal properties of the transmission spectra are destroyed by the application of the electric field. The first region unveils a fair narrowing in transmission properties. It is due to the breaking of symmetry in the potential profile as the applied bias inclines the potential profile. Owing to theWannier Stark effect, we notice a confinement of thesubminibandsand, hence the appearance of singular extended .states

Keywords
Dimer Fibonacci Height BarrierSingular extendedState, Exact Airy function and transfer matrix formalism

PA30
Energie Fondamentale D'Un Exiton Confiné Dans Une Nanostructure De Semi-conducteur De Type Cœur/Coquille. Effet De La Double Discontinuité Diélectrique.

Asmaa IBRAL[1], Asmaa ZOUITINE[2], Safae AAZOU[1], El Mahdi ASSAID[1], El Mustapha FEDDI[2], Francis DUJARDIN[3], et M'Hamed EL AYDI[1]

[1]Equipe d'Optique et Electronique du Solide, Département de Physique, Faculté des Sciences, Université Chouaïb Doukkali, B. P. 20 El Jadida principale, El Jadida, Royaume du Maroc.
eassaid@yahoo.fr
[2]Département de Physique, Ecole Nationale Supérieure d'Enseignement Technique, Université Mohamed V Souissi,
B. P. 6207 Rabat-Instituts, Rabat, Royaume du Maroc.
[3]Institut de Physique et d'Electronique de Metz, 1 Boulevard Arago, 57078 Metz, France.

Les effets combinés de la double discontinuité diélectrique, de la discontinuité des masses effectives de l'électron et du trou et du confinement quantique sur l'énergie fondamentale et l'état fondamental d'un exciton (X), confiné dans une nanostructure de semi-conducteur de forme sphérique de type cœur/coquille, enchâssée dans une matrice hôte diélectrique, ou noyée dans une solution organique sont étudiés dans le cadre de l'approximation de la masse effective et en utilisant la méthode variationnelle de Ritz. La nanostructure de type cœur/coquille est constituée par un cœur sphérique d'un semi-conducteur à bande interdite large et de constante diélectrique , enrobé dans une couche sphérique d'un semi-conducteur à bande interdite

étroite et de constante diélectrique , puis entouré par une matrice d'une constante diélectrique . En raison des décalages des bandes de conduction et de valence entre le cœur et la coquille, l'exciton se retrouve confiné dans le matériau ayant la bande interdite la plus faible. Du fait de la discontinuité diélectrique entre le cœur, la coquille et le milieu environnant, la paire électron-trou corrélée (*X*) est en interaction avec les charges de polarisation induites aux frontières de chaque matériau semi-conducteur. La fonction d'onde d'essai utilisée pour calculer l'énergie fondamentale de l'exciton (*X*) prend en compte l'interaction coulombienne entre l'électron et le trou. Les calculs théorique et numérique développés sont appliqués à des nanostructures de *CdS/HgS, InP/InAs* et *ZnS/CdSe* dans une matrice d'oxyde de silicium (SiO_2) et dans l'eau (H_2O). Il en découle que l'état fondamental et l'énergie fondamentale de l'exciton (*X*) sont fortement dépendants du rayon du cœur, de l'épaisseur de la coquille et aussi de l'hétérogénéité diélectrique entre les trois milieux.

***Mots-clés* :** *Hétérogénéité diélectrique, Exciton, Nanostructure de type Coeur/Coquille. Charges de polarization.*

PA31

Influence of deposition parameters on coatings morphology and structure of Zn–Fe alloys

S. AMIRAT[1], R. REHAMNIA[1], M. BORDES[2] and J. CREUS[3]

1- *Laboratory of Electrochemistry, University Badji Mokhtar, BP 12 EL-HADJAR, 23000 Annaba (Algeria)*

E-mail:amiratsam@yahoo.fr

2- *University of la Rochelle, FR-EDD CCA, Av. Michel Cre´peau, F-17042 La Rochelle Cedex 01 (France)*

3- *University of la Rochelle, LEMMA, Av. Michel Cre´peau, F-17042 La Rochelle Cedex 01 (France)*

Zinc coatings are widely used for the protection of steel structures in industry but the application conditions are more and more severe that implies an improvement of the protective and functional properties of Zn coatings. During the last decades, zinc alloys were studied in order to improve the corrosion resistance or the mechanical properties of zinc-based coatings [1–3].In this study, the kinetics of Zn–Fe codeposition was investigated in chloride acidic solution using cyclic voltammetry. Anomalous codeposition is detected and this mechanism depends on the Zn(II)/Fe(II) concentration ratio in the electrolytic bath. Influence of deposition parameters on the morphology and structure of the coatings is discussed using characterization

techniques andusing the anodic linear sweep voltametry (ALSV). The ratio between Zn(II)/Fe(II) considerably influences the structure of the alloys. Dense, uniform, and single phased Zn–Fe coatings could be obtained.

***Keywords**: electrodeposition, Zn–Fe alloy, corrosion, materials, ALSV,caracterization.*

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PA32

Investigation of the structural, optical and electrical properties of Nd-doped ZnO thin films deposited by spray pyrolysis

I. CHAKI[1], G. SCHMERBER[5], A. ELFAKIR[1], R. DIAZ[2], K. NOUNEH[4], P. PRIETO[2], N. HASSANAIN[1] ,
S. COLIS[5], M. ABD-LEFDIL[1], A. SLAOUI[3] AND A. DINIA[5]

[1] Université Mohammed V-Agdal, Faculté des Sciences, LPM, B.P. 1014, Rabat, Morroco
[2] Departmento de Física Aplicada C-XII, Universidad Autónoma de Madrid, Madrid, Spain
[3]InESS, UMR CNRS 7163 UDS, 23 Rue du Loess - B.P 43 F-67037 Strasbourg, France
[4] MAScIR Moroccan Advanced Science, Innovation and Research Foundation, ENSET, Av. Armée Royale, Rabat, Morocco
[5]IPCMS,UMR CNRS 7504 UDS-ECPM, 23 rue du Loess - B.P. 43, F-67034 Strasbourg, France
imane-fsr@hotmail.com

Over the last few years, pure and rare-earth-doped ZnO thin films have attracted much attention for both fundamental and technological reasons. Because of a wide band gap of 3.37 eV, a large exciton binding energy (60 meV) at room temperature, and peculiar optical properties, ZnO is promising as a candidate for optoelectronic applications. Doping ZnO with trivalent rare earth (RE) ions is well-known to enhance the optical activity. Therefore, we will report on the effect of Nd doping on the structural, optical, and electrical properties of $Zn_{1-x}Nd_xO$ thin films deposited on glass substrate by spray pyrolysis technique. All the films were deposited at 350°C during 77 min with a flow rate of the solution fixed at 2.6 mL/min. X-ray

diffraction and transmission electron spectroscopy and scanning electron spetroscopy have been used to inform on the effect of the doping on the structural quality and the morphology of the films. Rutherford Backscattering Spectrometry (RBS) has been used to inform on Nd distribution inside the ZnO matrix anto determine the thickness of the film. The photoluminescence properties have been investigated at room temperature to test the efficiency of such rare earth doped zinc oxides for photon shifting and their potential use for solar cells.

PA33

Étude de la transformation martensitique de l'alliage à mémoire de forme Ti-Ni équiatomique par frottement intérieur

Saida CHOUF, Soliman BELKAHLA

Laboratoire LEAM, Département de Physique, Faculté des Sciences, université Badji- Mokhtar, Annaba, B.P. 12, 23000, Annaba, Algérie.

soliman_belkahla@yahoo.fr

De part leurs propriétés particulières, les alliages à mémoire de forme [1, 2] (base Cu, base Fe et base Ti-Ni) ont vu leur domaine d'applications s'élargir de plus en plus: aéronautique, agroalimentaire, automobile, médecine, génie civil, etc. …. Les propriétés liées à l'alliage à mémoire NiTi (Nitinol) sont les phénomènes qui caractérisent une transformation de phase cristallographique thermoélastique à l'état solide et qui permet le passage d'une phase haute température (Austénite, BCC) à une phase basse température (Martensite, monoclinique). Outre ces deux phases, on peut observer dans certains cas une phase intermédiaire supplémentaire, appelée phase R, qui possède une structure cristalline rhomboédrique apparaissant sous certaines conditions. L'existence de la phase R dépend de plusieurs facteurs [3, 4] tels que: l'histoire thermique, l'écrouissage à froid et le vieillissement à des températures entre 400 et 500°C, ainsi que le cyclage thermique. Dans le présent travail, nous avons étudié l'influence des cycles thermiques et des traitements thermomécaniques sur les caractéristiques de l'alliage équiatomique Ti-Ni et la mise en évidence de la phase R par des mesures de résistivité électrique (RE), de frottement interne (FI) et de microdureté (HV). Nous avons pu vérifier que l'augmentation de la déformation à froid introduit des défauts, qui par leurs champs de contraintes diminuent les températures caractéristiques de la transformation martensitique thermoélastique de l'alliage $Ti_{50}Ni_{50}$. Ce qui permet de mettre

en évidence la présence de la phase prémartensitique R. D'autre part, nous avons pu montrer également l'influence de l'effet de la température de recuit vis-à-vis de l'apparition de la phase intermédiaire R. Cette température de recuit doit être comprise dans un domaine de température: elle doit être suffisante pour permettre une restauration d'un taux appréciable de défauts et inférieure à la température de recristallisation.

Mots clés: *Ti-Ni, alliage à mémoire de forme, transformation martensitique, résistivité électrique, frottement intérieur.*

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PA34

Influence du champ électriquesurla dégradation de la résistance d'un matériau isolant solide

B. HAMAIDI ; A .HADDOUCHE

Faculté des sciences de l'ingénieur ;Département d'électromécanique ; Laboratoire de genie électromécaniques ;Université Badji Mokhtar –BP 12 ;23000 Annaba -Algérie.

ham5615@yahoo.fr

Tout matériel électrique ou électronique est constitué d'un agencement judicieux de matériaux conducteurs qui servent à transporter l'énergie électrique (ou l'information) la ou elle doit être utiliser et de matériaux isolants qui permettent d'empêcher celle ci de se perdre en empruntant le plus court chemin d'un potentiel à un autre. Outre leur fonction première qui est de s'opposer au passage du courant entre conducteurs, les isolants solides ont également le rôle de maintenir mécaniquement les conducteurs dans les conditions prédéterminées. Le rôle essentiel des isolants étant de servir de barrière. On sait que la grande majorité de matériels électriques ou électroniques fonctionnent sous des tensions alternatives ; et le rôle important que joue la permittivité dans le stockage de l'énergie dans un condensateur ; ou de réduire les capacités parasites. Lorsqu'on

augmente la valeur du champ électrique appliqué a un isolant, on aboutit à un mécanisme destructif irréversible appelé claquage diélectrique. Pour cela, notre travail consiste à étudier tous les phénomènes qui font qu'un isolant présentant des caractéristiques satisfaisantes â court terme peut voir celle-ci se dégrader à long terme sous l'effet du champ électrique avec pour conséquence un claquage diélectrique, et de proposer une méthode qui permet de choisir un isolant solide pour une application déterminée.

Mot clés : *matériau isolant – champ électrique – dégradation – claquage diélectrique – tension alternative.*

PA35

Mise en œuvre d'un séparateur à bandes transporteuses et d'un chargeur triboélectrique statique dans la séparationélectrostatique de mélange granulaire isolant/isolant

REZOUG.M[1], MILOUDI.M[1], OUIDDIR.R[2], MEDLES.K[1], TILMATINE.A[2]

[1].*Electrostatics and High Voltage Research Unit IRECOM, University Djillali Liabès Sidi Bel Abbès 22000, Algeria*

kmedles1972@yahoo.fr

[2] *APELEC Laboratory, Faculty of Technology, Djillali Liabes University*

rabah61@yahoo.fr

La multiplication des mesures réglementaires associées aux règles concernant la valorisation des déchets issus des équipements électriques et informatiques, constituent une stratégie intégrée permettant une utilisation soutenable des ressources naturelles.

L'objectif principal de notre travail est la mise en œuvre d'un procédé de séparation triboélectrique utilisant un tapis roulant à bandes transporteuses isolantes, en association avec un nouveau procédé d'acquisition de charge par effet triboélectrique. Cette application est destinée en particulier à la récupération des produits granulaires issues du broyage des carcasses des équipements électriques et informatiques dont l'ABS, le HIPS, PA, PC à eux seuls plus de 75 % de l'ensemble de la matière totale. Comme l'ensemble du dispositif est multifactoriel et nécessite beaucoup d'expériences en vue de son optimisation, vu que les différents facteurs interagissent entre eux, nous avons utilisé la méthodologie des plans d'expériences qui s'avère un outil efficace pour l'optimisation des procédés technologiques et expérimentaux.

Keywords*: séparateur tribo-électrostatique, plan d'expérience, déchet d'équipements électriques et électronique*

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PA36

Influence des sables de moulage sur le nombre de grains de graphite et sur le taux de ferrite dans les fontes grises à graphite sphéroïdal à matrice ferritique.

A.LEMMOUI[1], B. KHATEMI[2]

1.Laboratoire de Mise en forme des matériaux métalliques, Université Badji Mokhtar, BP12 - 23000, Annaba, Algérie.
2. Faculté des Sciences et technologie et des Sciences de la matière- Université Ibn khaldoun de Tiaret, BP 78, Tiaret- Algérie.
abysms55@yahoo.fr

Les fontes grises à graphite sphéroïdal se caractérisent par des propriétés mécaniques et chimiques élevées proches de celles des aciers. De nombreuses études ont montré que les propriétés mécaniques de cette classe de fonte dépendent du nombre de grains de graphite, de leur sphéricité et de la constitution de la matrice [5, 6]. Les fontes à matrice ferritique présentent une résistance suffisamment élevée couplée à une bonne capacité à se déformer plastiquement ainsi qu'une bonne résistance aux chocs. Leur faible résistance à l'usure leur donne une bonne aptitude à l'usinage, lequel est de plus facilité par le caractère lubrifiant du graphite. Des études sur ces fontes ont permis également de constater que plus la sphéricité des particules de graphite est élevée, plus les propriétés mécaniques sont élevées [1, 5,6]. Dans les fontes grises GS, les sphéroïdes de graphite ont des propriétés anti-fissuration et de ductilité et plus leur nombre est élevé plus la fonte présente de meilleures propriétés mécaniques. Dans ces fontes, la nature de la matrice

et le taux de ferrite sont dépendants de plusieurs paramètres dont notamment la vitesse de refroidissement, l'épaisseur et les formes des pièces. Plus la vitesse de refroidissement est lente plus le taux de ferrite est important [3, 5,6].Le présent travail fait l'objet de l'étude de l'influence des sables de moulage (sable à vert, à base de résine furanique et à base de silicate de soude) sur le nombre de grains de graphite d'une part et sur le taux de ferrite d'autre part pour différentes épaisseurs des échantillons.

***Mots clés** : fonte GS, nombre de sphéroïdes de graphite, taux de ferrite, propriétés mécaniques, microstructure.*

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PA37

Elaboration and characterization of sprayed Tb-doped ZnO thin films

A. ELFAKIR[1*], R. DIAZ[2], I. CHAKI[1], P. PRIETO[2], A. BELAYACHI[1], A.DOUAYAR AND M. ABD-LEFDIL[1].

[1]Université Mohammed V-Agdal, Faculté des Sciences, LPM, B.P. 1014, Rabat, Morocco.

[2]Departamento de Física Aplicada, Universidad Autónoma de Madrid, Spain.

** : **amina.elfakir@gmail.com***

ZnO and Tb-doped ZnO (TZO) thin films were deposited on glass substrate at 350 °C by spray pyrolysis technique. Structural, optical and electrical properties of the films were investigated as a function of dopant concentration, which was varied between 0 and 5 at% of terbium. TZO films were polycrystalline and exhibit hexagonal wurtzite crystal structure with a preferential orientation along [002] direction. The AFM measurements show that the roughness of the films increased with Tb doping. All the TZO films exhibit a transmittance between 70 and 80 % in the visible range. The TZO films were n-type degenerate semiconductor with a lowest electrical resistivity of about 6.0 × 10 -2 Ω.cm.

***Keywords:** Spray pyrolysis, Thin films, Tb-Doped ZnO, Characterization.*

PA38
Dielectric Functions and Interband Transitions in Anisotropic Layered Structured Tl_2GaInS_4Crystals by Spectroscopic Ellipsometry

N.M. HASANLI[1], M. ISIK[2], S. DELICE[1]
Department of Physics, Middle East Technical University, 06800 Ankara, Turkey
nizami@metu.edu.tr
[2]Department of Electrical and Electronics Engineering, Atilim University, 06836 Ankara, Turkey

Spectroscopic ellipsometry measurements were carried out on Tl_2GaInS_4 layered crystals for orientations of electric field vector, parallel (***E*//*c***) and perpendicular (***E*⊥*c***) to optical axis ***c***. Single crystals of Tl_2GaInS_4 were grown by Bridgman method. The chemical composition of Tl_2GaInS_4 crystals was determined by energy dispersive spectroscopic analysis. The crystals peeled readily along the cleavage plane perpendicular to the optical ***c*** axis. In order to carry out the ellipsometric measurements for both ***E*//*c*** and ***E*⊥*c*** configurations, the ingots were cut perpendicular to the crystal layer (parallel to the optical ***c*** axis) and the surfaces produced were ground and polished. The ellipsometric measurements on the Tl_2GaInS_4 single crystals were carried out at room temperature in the 1.2–6.2 eV spectral range using SOPRA GES-5E rotating-polarizer ellipsometer. The real and imaginary components of the dielectric function, refractive index and extinction coefficient were calculated from the analysis of ellipsometric data. The energies of interband transitions (critical points) have been found from the least-square fitting of the second derivative spectra of the dielectric functions. In the studied energy ranges, fitting program revealed five each interband transition structures with critical point energies of 2.38, 2.59, 3.30, 3.96 and 4.67 eV for ***E*//*c*** and 2.65, 3.27, 3.50, 3.94 and 4.70 eV for ***E*⊥*c*** configurations**.** The obtained critical point energies were assigned tentatively to interband transitions using the energy band structure available in literature.

Keywords*:Layered crystals, Dielectric function, Ellipsometry, Refractive index, Extinction coefficient*

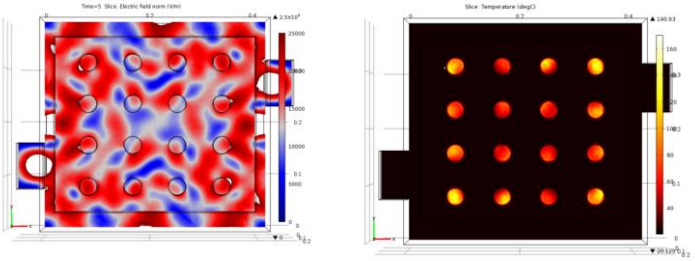
PA39

Simulating electromagnetic field inside cavities charged with dielectric materials

Diana Seiça FIDALGO[1], Jorge MONTEIRO[1], Luís Cadillon COSTA[1]
[1]*I3N and Physics Department, University of Aveiro, 3810-193 Aveiro, Portugal*
kady@ua.pt

Microwaveheating has been widely used in the industry to synthesize dielectric materials, in which conventional procedures are slow, expensive and inefficient. In this application, the energy is introduced directly into the volume of the dielectric and as consequence the quality of the process is highly dependent on the uniformity of the electromagnetic field distribution along the material. That is, the non-uniformity of the heating is a potential problem with serious consequences.

To understand this phenomenon, a perceptive of how electromagnetic field propagates and is absorbed by materials is essential, and then we carried out the electromagnetic field simulation in a microwave oven loaded with dielectric samples of composite cork. To perform this task we measured the complex permittivity of the material at microwave frequencies, using the resonant cavity method.



Electric field and temperature distributions, for a cavity with 32 cork stoppers, using 2 magnetrons of 1 kW, at 2.45 GHz, with 5 seconds of radiation.

***Keywords**: Microwaves, dielectric properties, cork.*

PA40

The study of a new ceramic PZT material with SEM and X-ray diffraction

KRIBAA Oum Keltoum[*], BOUTARFAIA Ahmed[**]
[*]*University of BISKRA(0700), ALGERIA.*
[**]*University of OURGULA, ALGERIA*
kribaa_keltoum@yahoo.fr

The PZT are modified by the introduction of doping agents in A-sites and / or B-sites of perovskite structure [1]. The pricipal role of dopants is

generally improving the properties of these materials for their adaptation to specific applications), it is the purpose of this study. our choice fell on the mixed oxide: acceptor and donor (Ni^{2+}, Y^{3+} ,Mo^{6+}) in site B, and (Sm^{3+}, Nd^{3+}) in the A site. Five compositions with varying dopants pourcentage were prepared by the conventional method of thermal synthesis of mixed-oxides.

$Pb_{1-0.04}Sm_{0.02}Nd_{0.02}[(Zr_{0.55},Ti_{0.45})_{1-2x},x(Y_{2/3},Mo_{1/3}),x(Y_{2/3},Ni_{1/3})]O_3$ such that (x = 0.01 , 0.03 , 0.05 , 0.07 and 0.1), Are studied. The characterization of these PZT ceramics was carried out with XRD and SEM. X-ray diffraction is presented to demonstrate the co-existence of the tetragonal and rhombohedral phases. The lattice parameter measurements showed that tetragonal and rhombohedral unit cells of the phases depend on the sintering temperature. The effects of sintering temperature on microstructure are studied by means of a scanning electron microscope (SEM).

Keywords: *sintering; X-ray diffraction; tetragonal; rhombohedral; PZT ceramic*

PA41

Density Functional Study of The Structural, Elastic And Electronic Properties Of The Some Spinels Compounds

M.KHALFA[1], H. KHACHAI[2], K. BOUGHERARA[1]

[1.]University djillali liabes, sidi bel

abbesm_khalfa10@yahoo.fr

[2].Material applied laboratory, university djillali liabes, sidi bel abbes

The effect of high pressures, up to 30 GPa, on the structural, elastic and electronic properties of XMg_2O_4, with *X* = Ge and Si, were studied by means of the full-relativistic version of the full-potential augmented plane wave plus local orbitals. We employed both within the generalized-gradient approximation (GGA) for exchange and correlation. They are characterized by several desirable properties, e.g. a high melting point, high reflectivity, high strength, chemical resistivity at elevated temperatures and low electrical loss [1, 2] which make them candidate materials for numerous applications in geophysics, magnetism, catalysis and the environment [3-6]. The results of bulk properties, including lattice constants, internal parameters, bulk modulus and derivatives are obtained. The band structures show a direct band gap (Γ-Γ) for the two compounds. All the calculated band gaps increase with increasing pressure and fit well to a quadratic function. The analysis of the density of states revealed that the lowering of the direct gap (Γ–Γ) from $GeMg_2O_4$ to $SiMg_2O_4$ can be attributed to the p–d mixing in the upper valence band. The elastic constants and their pressure dependence are

calculated using the static finite strain technique. We have observed a linear dependence of the elastic moduli on the pressure. We derived the bulk modulus, shear modulus, Young's modulus and Poisson's ratio for ideal polycrystalline XMg_2O_4 aggregates. We estimated the Debye temperature of XMg_2O_4 from the average sound velocity.

Keywords: *ab initio calculation. Pressure effect. Structural properties*

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PA42

Etude par Spectroscopie Simplex-CDTS, les effets du vieillissement et du taux de cristallinité dans les diélectriques organiques

Halima BENCHENANE-MEHOR[1,2], Manil M. SOUFI[3], Mohamed BENZOHRA[3], Jean-Marc SAITER[3]

[1] *Laboratoire CaSiCCE, Département de Génie Electrique, ENSET-Oran, B.P. 1523, El M'Naouer, 31000 Oran, Algérie*

[2] *Laboratoire de Microphysique et de Nanophysique (LaMiN), Département de Physique-Chimie, ENSET-Oran, B.P. 1523, EL M'Naouer, 31000 Oran, Algérie*

halima_mehor_2000@ yahoo.fr

[3]*Laboratoire LECAP-AMME, EA 4528, Université de Rouen, Faculté des Sciences, Avenue de l'Université BP 12, 76801 Saint Etienne du Rouvray, France.*

Les polymères sont désormais en mesure d'offrir des solutions pertinentes pour la réalisation de capteur de haute spécificité et sensibilité. Ils sont également demandés à accompagner le développement croissant des microsystèmes, dès qu'ils seront intégrés dans la microtechnologie du silicium. Les polymères sont largement utilisés dans plusieurs domaines comme guides d'ondes optiques, diodes et transistors. Le temps de relaxation associé aux mouvements moléculaires est un paramètre fondamental qui caractérise à la fois le comportement électronique du diélectrique et son vieillissement dans le temps. La spectroscopie « Simplex-CDTS » est la technique

d'analyse temporelle des mesures isothermes des transitoire des courants de dépolarisation thermostimulés[1]en se basant sur la méthode d'optimisation mathématique du Simplex[2], généralisable à différents matériaux diélectriques, donne une estimation très précise du temps de relaxation se produisant à la température de transition vitreuse. Dans ce travail, nous allons analyser par la méthode Simplex-CDTS l'effet du vieillissement ainsi que celui du taux de cristallisation. Nous avons donc entrepris des études sur les temps de relaxation obtenus par spectroscopie Simplex-CDTS sur le vieillissement de la structure polyéthylène-téréphtalate (PET) et sur le taux de cristallisation de la structure poly-L-acide-lactique (PLLA).

Mots Clés *: Dynamique moléculaire, Transition vitreuse, Temps de relaxation, Courants de dépolarisation thermostimulés, Simplex-CDTS*

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PA43

Prediction of metallic properties for the Heusler alloys Cu_2MnX (X=N, P, AS, Sb) A first- principles study

S-I.MESSAOUDI[1], M. FERHAT[2]

[1] Faculté des Sciences, Laboratoire LEPM, Université Des Sciences et de la Technologie Mohamed Boudiaf d'Oran,

Ilhem_phy@hotmail.com

[2] Faculté des Sciences, Laboratoire LEPM, Université Des Sciences et de la Technologie Mohamed Boudiaf d'Oran,

Magnetically driven actuator materials, such as the ternary and intermetallic Heusler alloys with composition X_2YM, are studied within the density-functional theory (DFT) with the generalized gradient approximation (GGA) for the electronic exchange and correlation. The geometrical and electronic structures for the magnetic L21 structure are calculated. The structures and magnetic moments at equilibrium are calculated.

PA44

Mesure de permittivité complexe d'un liquide diélectrique en fonction de la température à 9,460GHz par la méthode du court-circuit variable

MANSOUR Mahdi[1],HAINE Nasreddine [2], SAYAH Bilal

[1]*Laboratoire de Physique des Matériaux. Équipe Diélectriques Faculté de Physique, Université des Sciences et Technologies Houari Boumediene, B.P. N°322, El-Alia, Bab Ezzouar,16111 Alger , Algérie.*

man.mehdi@hotmail.fr

[2]*Laboratoire de Physique des Matériaux. Équipe Diélectriques Faculté de Physique, Université des Sciences et Technologies Houari Boumediene, B.P. N°322, El-Alia, Bab Ezzouar,16111 Alger , Algérie.*

Le terme hyperfréquences sert à désigner une bande de fréquence située entre environ 300 MHz et 300 GHz, caractérisant des longueurs d'ondes allant 1m à 1mm. En effet, ces ondes sont employées dans le domaine de la recherche physique, notamment dans les techniques de caractérisation des matériaux comme la mesure de la permittivité diélectrique.

La caractérisation diélectrique des matériaux est basée sur l'étude de l'interaction onde matière. Un matériau est caractérisé par sa permittivité relative complexe (ε^*=ε^'-jε^"), qui traduit la réaction du milieu face à une excitation électrqiue sa perméabilité μ qui traduit son comportement face à une excitation magnétique. Dans cette présente communication, on se propose de caractériser les propriétés diélectriques de l'eau distillée en fonction de la température à 9,460 GHz. La cellule de mesure est un guide d'onde métallique rectangulaire court-circuité. Le liquide est injecté dans la cellule, il s'établit donc à l'intérieur de celle-ci des ondes stationnaires caractérisées par les coefficients de propagation guidée β_g et d'amortissement α. Ces deux paramètres sont déterminés en premier lieu par une méthode graphique approximative puis corrigés par ajustement des valeurs théoriques aux données expérimentales. La théorie de la propagation guidée permet de formuler la permittivité complexe du matériau en fonction des deux paramètres mesurables αet β_g. Enfin, une comparaison entre les résultats obtenus et d'autres rapportés de la littérature montre un accord.

Mots clefs: *eau distillée, matériaux polaires, hyperfréquences, permittivité diélectrique.*

PA45

Contribution to the study of problems of circumvention of insulators located in polluted areas

N.MANSAR[1], D.BOUZID[1] .

1. Institute of Optics and Precision Engineering University Ferhat Abbas Setif Algeria 1900

namansar@yahoo.fr

Circumvention of polluted insulators is one of the major problems faced by operators of electricity networks and represents 80% of the faults of EHV power lines. Proper sizing of the external insulation of electric overhead lines and substations is conditioned by knowledge of the severity of pollution and climatic conditions of the site, two classes of measures are:

- Measures in non-real time:

Such measures on isolators are tested (exposed in testing stations on site), continuously or periodically to an accurate knowledge of all the information needed to assess the severity of sites for the development of national and regional maps of pollution, the knowledge the different values of the conductivities, the programming maintenance (decontamination), re-isolation of existing networks, design of isolation for the study of a new line project....

-Real-time measurement:

It is installed on insulators station alarms based on measurements of current flowing on their surfaces at reduced voltage to determine the ESDD, the counting pulse leakage current measurement leakage current and whether any of the values exceeds the critical value a warning signal is given.

Finally we present in this paper the statistical summaries of the testing station, the model for calculating the ESDD, the NSDD, conductivity.

Keywords: *insulator, Bypass, Pollution, ESDD, creepage, NSDD, Conductivity, warning of pollution*

PA46

Growth and characterization of Eu^{3+} Doped Diphosphate $Na_2ZnP_2O_7$

L. GACEM[1], A.GUEDDIM[1], J.-P. CHMINADE[2]

[1] Materials Science and Informatics Laboratory, Faculty of Science, University of Djelfa, Algeria

[2] ICMCB, 87, Avenue du Docteur Schweitzer, 33608 PESSAC cedex (France)

gacem_lakhdar@yahoo.fr

Wide band gap inorganic materials (oxides, fuorides, sulfdes, phosphates, etc.), actived by rare-earth ion elements are widely and extensively investigated and used in several applications. Because of the extraordinary versatility of phosphate structures which facilitates the design of new compounds with appropriate optical properties, they have gained much more attention of several researchers.Undoped and Eu^{3+}-doped disodium zinc diphosphate Na_2ZnP_2O7 (NZPO) single crystals are grown by the Czochralski method. X-ray diffraction, Fourier transform infrared and Raman techniques were used to check the crystallographic structure. Excitation and emission spectra were measured at room temperature and studied. The Eu^{3+} ions occupy a non-centrosymmetric site with different coordination number. Very efficient energy transfer from O_Eu^{3+} band state to Eu^{3+} excited energy levels is highlighted.

PA47

Studyof the effect ofmagnetic field onthe ionization of theplasmaof the arcof a circuit breaker

B.HAMAIDI, A .HADDOUCHE

Faculté des sciences de l'ingénieur ;Département d'électromécanique ; Laboratoire de genie électromécaniques ;Université Badji Mokhtar –BP 12 ;23000 Annaba -Algérie.

ham5615@yahoo.fr

Circuit breakers are used in electrical installations where they play an essential role in protecting people and systems against short-circuits and overloads. These circuit breakers utilize the spontaneous appearance of an electric arc current limiting short-circuits in an installation. Technically the breaker must be able to interrupt or establish strong operating current overload or short circuit and also be able to support constraints in electric fields. The value of this electric

field is critical to avoid failure of the dielectric break after the extinction of the arc. The geometrical shapes knowledge of the circuit breaker plays a fundamental role in determining the electric field. The problem is then to act on the arc and its dynamics in order to accelerate its extinction, and thus improve the quality of the power interruption. Unfortunately, the electric arc has explosive properties (phenomenon fast and unstable) and destructive to the device. Many physical laws (mechanics of fluids, electromagnetism), intervene and complicate attempts to improve the circuit breakers on the limitation of short-circuit fast extinction of the arc, increase in the number of operation. For that and starting from the magnetic diagnostics, we must conduct studies on the dynamics of the arc in the medium voltage switchgear. (MT). The objective is to present a study on the phenomena caused by the presence of separators, the displacement of the arc in order to optimize the cutoff. The study shows that modeling of circular electrodes generates a factor of Schwaiger very low value and that the electrical constraints are only localised in the vicinity of one electrode.

***Keywords**: Dielectric - Electrical field-medium voltage circuit breaker magnetic-diagnosis.*

PA48

Monte Carlo study of the magnetic behavior of asuperlattice with alternate layers

A. FERAOUN[1], A. ZAIM[*1] and M. KEROUAD[1]

[1] Laboratoire Physique des Matériaux et Modélisation des Systèmes (LP2MS), Unité Associée au
CNRST-URAC: 08, Faculty of Sciences, B.P. 11201 Zitoune,
Meknes, Morocco.
ah_zaim@yahoo.fr

In this paper, we applied Monte Carlo simulation based on Metropolis algorithm to study the magnetic behavior of a superlattice Ising model, the system is made up to S layer type (S= ±1,0) and σ layer type (σ= ±3/2, ±1/2). We investigated the effects of exchange interaction coupling between the spin configurations S and σ for different values of temperature at fixed values of the crystal field. Also, the effect of crystal field on the thermal and magnetic properties

of the system is examined. We find a number of characteristic phenomena. In particular, compensation temperature, first- and second-order phase transition temperature and magnetization profiles are investigated in detail.

Keywords **:** *Critical behavior; Superlattice; Monte Carlo simulation.*

PA49

Effect of barium on characteristics, surface texture and reactivity of titania.

Madani GHELAMALLAH[1],Soufi KACIMI[2], Radia Imane FERTOUT[3]

[1]*Laboratoire de Matériaux, Applications et Environnement, Faculté des Sciences et de la Technologie, Université de Mascara, BP 305 Route de Mamounia, Mascara 29000, Algeria*

gh_madani@hotmail.com

[2]*Centre Universitaire d'Aïn-Témouchent (CUAT), BP 284, Aïn-Témouchent 46000, Algeria*

[3]*Laboratoire de Matériaux et Catalyse, Faculté des Sciences Exacte, Université Djillali Liabes, BP 89 Hai Larbi Ben Mhid, Sidi Bel-Abbes22000, Algeria*

The examples of utilization of TiO_2 are numerous: in electronics luminescent, ceramic dielectrics for integrated circuits for microwave, isolators. In catalysis, reactions of oxidative coupling of methane (COM), oxidation, hydrogenation, hydrogenolysis of hydrocarbons, and automotive post-combustion. Recently, titanium oxide doped by group IIA elements may strongly influence solid state reaction. A serie of samples, noted TiBaX (where X = % atomic of barium) have been prepared by hydrolysis in neutral medium from TiO_2 and $BaCO_3$. These samples were calcined under air at 450 and 1150 °C then characterized by specific surface area (BET), X-ray photoelectron spectroscopy (XPS), thermogravimetry (TG) and differential thermal analysis (DTA). After hydrolysis TiO_2 is only partially hydrated. Obtained results show that after calcination at:

- 450°C the surface area of TiBa0 increase slightly. Barium addition appears with negative effect on surface of TiO_2. The XPS have detected three peaks C1S, dues to the contamination by carbon, carbon linked to an oxygen C-O and carbon linked to two oxygen O-C=O. Three other peaks O1S correspondent to O^{2-}, carbonates and oxygen linked to H result by adsorbed H_2O.
- 1150°C, the effect of sintering is significant; surface of TiBa0 is lower than 1 $m^2\ g^{-1}$. This effect is reduced with barium added how the surfaces increases with rate of barium added.

The reaction between TiO_2 and $BaCO_3$ showed two endothermic weight losses; elimination of water and decarboxylation of $BaCO_3$. It noted that anatase is transformed into rutile and $\gamma BaCO_3$ into $\beta BaCO_3$.

Keywords:*TiO_2; Barium; Calcination; Surface; Reactivity*

PA50

Impact of ceria on physicochemical properties of alumina

F. BOUSEHABA, A. BELLIFA, M. GHELAMALLAH, Z. SOLTANI AND K. ARIBI

Laboratoire de Matériaux, Applications et Environnement, Faculté des Sciences et de la Technologie, Université de Mascara, BP 305 Route de Mamounia, Mascara 29000, Algeria

abellifa@yahoo.fr

The use of Al_2O_3 shows more interest for the process of dry reforming of methane because of its behaviour redox, acidity of surface and high thermal stability. The basic oxide addition (e.g. CeO_2) improves the catalytic performance and increases also the dispersion of metal, therefore to develop resistance to sintering by limiting the formation of carbon. Recently, aluminium oxide doped by ceria may strongly influence solid state reaction.

A series of samples, noted AlCeX (where X = atomic % of ceria) have been prepared by hydrolysis, in neutral medium from Al_2O_3 and CeO_2. These samples were calcined under air at 450, 900 and 1200°C then characterized by specific surface area (BET), X-ray diffraction, and thermoreduction programmed under H_2 ($TRPH_2$). After the treatment of hydrolysis, Al_2O_3 is only partially hydrated, which explains a light increase in its specific surface area. As for CeO_2 preserve its initial surface. The results obtained show that after calcinations at:

- 450 °C, the specific surface area of Al_2O_3 returns to its initial value. The addition of CeO_2 appears to have a negative effect on surfaces of AlCeX. Results of XRD and $RTPH_2$ showed that the samples are constituted of: Al_2O_3 and CeO_2. It is noted that the global consumption of hydrogen increase with rate of CeO_2 added.
- 900 °C, the effect of sintering decreases slightly surfaces of oxides. Results of XRD and $RTPH_2$ do not show any interaction between Al_2O_3 and CeO_2.
- 1200 °C, the sintering of the samples is very important and Al_2O_3 is transformed into the alpha phase. A result of $RTPH_2$ shows that the consumption quantity of H_2 increases in the same order as the temperature.

Keywords:*CeO_2, hydrolysis, reducibility, surface, structure.*

PA51

Effect of Irradiation Parameters on Defect Aggregation during Thermal Annealing of LiF Irradiated with 150 MeV Kr Ions

Darya ALONTSEVA[1], Ibrahim NASSAR[2], Alyona RUSAKOVA[3], Aleksandr KRASAVIN[1]

[1]*East – Kazakhstan State Technical University, 69 Protazanov, 070004, Kazakhstan*
dalontseva@mail.ru,

[2]Egyptian Petroleum Research Institute (EPRI), Nasr City, Cairo, Egypt
inassar32@yahoo.com

[3]*Eurasian National University, 5 Munaitpasov, 010008, Kazakhstan*

This paper focuses on defects in LiF induced with high energy heavy ions (150 MeV Kr) at high fluence and flux (beam current) and their transformation during thermal annealing.For the experiments high quality LiF crystals were used. They were irradiated normal to one of the (001) cleaving planes with 150 MeV Kr^{+14} ions (range R = 17.8 μm [1]) at room temperature. The annealing was carried out in atmosphere at temperatures from 400 K to 870 K for 15 min at each temperature.Color centers in LiF crystals were studied under irradiation at room temperature with 150 MeV Kr ions in the fluence (Φ) range of $10^{10} – 10^{14}$ ions/cm^2 with a beam current density of 10, 50, and 100 nA/cm^2, corresponding to flux of 4.46×10^9, 2.23×10^{10} and 4.46×10^{10} ions/(cm$^2\times$s), respectively. At $\Phi\geq 3\times10^{12}$ions/cm^2 besides F and F_n centers also charged F_3^+ centers develop. Under high fluence and flux the color center development takes place both as (F – H) and ($\alpha – I$) Frenkel pairs. Thermal annealing of irradiated LiF crystals with $\Phi \geq 10^{13}$ ions/cm^2 at 400 K leads to a decrease of F centers (due to annihilation with H centers) and an enhancement of complex F_n color centers (neutral and charged) due to interaction with thermally stimulated anion vacancies. Annealing LiF crystals at higher temperature ($T \geq 400$ K) leads to a decrease both of F centers and F_n centers. In the annealing process up to 480 K F_2 and F_3^+ centers are dominating until their annealing at above 590 K. At temperatures above 740 K mainly small Li and trace element (Mg, Na) colloids are present in the absorption spectrum.

Keywords: *Ionic crystals, defect creation, color centers, ion tracks*

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PA52

Interaction metalcluster-intense femtosecond laser

BRICHNI Abderrazek[1,*], BOUCERREDJ Noureddine [1]

[1]Laboratoire des Semi-Conducteurs, Département de Physique, Faculté des Sciences, Université Badji-Mokhtar,BP 12, Annaba, DZ-23000,Algérie.

*[*] : **a.brichni@gmail.com***

We study the metallic clusters (K and Na), contained 510^4 atoms per cluster, irradiated by an intense femtosecond laser pulse ($I_{pic} \approx 10^{18}$ w/cm^2). The irradiation of these clusters by the intense laser leads to highly excitation energy which is the source of energetic electrons, electronics emission, highly charge and energetic ions and fragmentation process.

For the study of different mechanisms of ionization of the cluster, we are used the modified Nanoplasma model proposed firstly by T. Ditmire [1, 2, 3] et al, and modified for our study. In this model, we consider a cluster with radius of a few nanometers irradiated by a linearly polarized intense laser field. The dimensions of the cluster are much smaller than the laser wavelength. The model treats all ionization mechanisms: heating, electronic emission and the expansion process of the cluster. The goal of our study is to investigate in detail the dynamics of ionization, expansion and explosion of the cluster and to study the different factor leading to the final explosion of the large cluster of Kr. We are found ions with energy up to a few keV.

***Keywords**: Nanomaterials, Intense femtosecond laser, Metallic clusters, and laser cluster interaction, Nanoplasma.*

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PA53

Etude Des Propriétés Electroniques Des Chalcopyrites De Type $CuInX_2$(X=S, Se, Te)

Fatima Zohra SAIL[1], Nassera GHELLAI[1]

Unité de recherche des Matériaux et des Energies renouvelables (U.R.M.E.R)
Université de Tlemcen BP: 119 TLEMCEN 13000 ALGERIE

na_ghellai@yahoo.fr

Actuellement, l'intérêt est porté sur les chalcopyrites, principalement le groupe d'alliages $CuInX_2$(X=S, Se, Te),dans les applications photovoltaïques. Ils ont un rôle primordial dans les piles solaires en couches minces, vu l'importance de leurs propriétés électroniques. Notre travail consiste, de ce fait, à étudier la structure électronique de ces composés en utilisant les différentes approximations incluses dans le calcul du premier principe (*ab initio*) dite méthode des ondes planes augmentées linéarisées (FP-LAPW), dans le cadre de la théorie de la fonctionnelle de la densité (DFT).Ainsi, les structures de bandes, les énergies de gap et les densités d'états sont bien déterminées et améliorées par l'utilisation d'une nouvelle approximation EV-GGA

PA54

Angular dependence of the critical current density and the Temperature scaling of the flux pinning force in YBCO thin film

A. HAFID[1], A. TAOUFIK[1], A. BOUAADDI[1], H.EL HAMIDI[1], B.LMOUDEN[1], M. BGHOUR[1], H.ELOUADDI[1], A.TIRBAYINE[2], A.RAMZI[1].

[1]Laboratory of Materials Superconductors at High Critical Temperature, Ibn Zohr University, Agadir, Morocco.

asskti@hotmail.com

[2]Université Cadi Ayyad, Faculté Poly-disciplinaire, B. P. 4162, Route Sidi Bouzid 46000 Safi, Morocco.

We investigated the magnetic-field angle dependence of critical current densities (Jc) (Θ angle between the c-axis and the applied magnetic field direction) and the dependence of the normalized pinning force f=Fp/Fpmax on the normalized magnetic field. The studied sample is a monocristalline YBaCuO thin film deposited by the ablation laser method on the surface (001) of a SrTiO3 substrate. In zero magnetic field, the resistance vanished a Tc= 90K. The C-axis of YBaCuO is perpendicular to surface of the film. Electrodes of measurement are in gold and deposited on the surface of the sample in situ by evaporation. The film has a thickness of 400 nm, and a width 7.53 µm. The distance between electrodes of power measurement is 135 µm. Contact resistances were less than 1 Ω^1.The following figures show examples of the results. Ceci nous permet d'avoir une bonne amélioration des calculs d'énergies du gap, surtout pour le composé

$CuInTe_2$. Elle nous donne des valeurs plus proches des valeurs expérimentales.

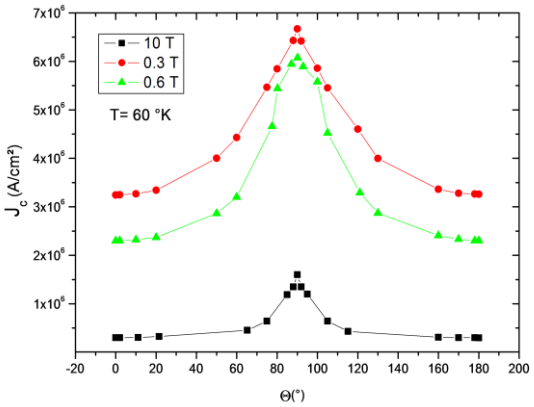

Figure 1. *The angular dependence of the critical current density Jc(□) at 60 K for thre values of magnetic field (0.3 T 0.4 T and 10T)*

Mot clés : *propriétés électroniques,DFT, ab-initio, $CuInS_2$, $CuInSe_2$, $CuInTe_2$*

PA55

The impact of the crystalline structure of Al-doped ZnO thin films deposited by DC sputtering on the 1/f noise

A. BARHOUMI[1], L.YANG [2], N. SAKLY[3], H. BOUGHZALA[4], G. LEROY[2], J. GEST[2], J-C. CARRU[2], S. GEURMAZI[1]

[1]*Université Sfax, IPEIS, Route Menzel Chaker, PB 3018, Sfax, TUNISIE*

Amira_barhoumi@yahoo.fr

[2]*Université de Littoral-Côte d'Opale, Centre de la Mi-Voix, BP717, 62228-CALAIS cedex, FRANCE*

[3] *Université Monastir, Faculté des Sciences de Monastir, 5000 Monastir, TUNISIE*

[4]*Université El Manar, Faculté des Sciences de Tunis, Campus Universitaire 1060 Tunis, TUNISIE*

Al-doped ZnO (AZO) thin films have been prepared using the DC sputtering technique at different substrate temperatures. It was found that the 1/f noise of the films depended directly on the crystalline structure of AZO thin films. X-Ray diffraction (XRD) results reveal that the AZO thin films have a hexagonal wurtzite structure with (002) preferred orientation. (002) peaks indicate that the crystallite structure of the films is oriented with their c-axis perpendicular to the substrate.

AFM three dimensions (3d) of AZO thin films deposited on glass substrate at 200°C, 300°C and 400°C respectively show the improvement of the crystallinity and the homogeneous of AZO thin films with Ts which is in agreement with the noise measurement. The noise was characterized below 100 kHz and we have obtained 1/f spectra. The noise is very sensitive to the crystal structure especially to the orientation of the crystallites which is perpendicular to the substrate and to the defects at the joints of crystallites which generate a high current flow and a sharp increase in noise.

***Keywords**: AZO, Thin film, DC sputtering, XRD, AFM, 1/f noise*

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PA56
PROPRIETES ELECTRIQUES DU POLYETHYLENE TEREPHTALATE IRRADIÉ AVEC DESRAYONS GAMMA

M. BENAISSA, N. SAIDI-AMROUN, M. SAIDI
Laboratoire de Physique des Matériaux
Equipe « Diélectrique » Faculté de Physique, U.S.T.H.B.
BP32. El Alia 16011 Alger, Algérie
bardou47@hotmail.fr

Les matériaux polymères isolants installés dans les dispositifs électriques sont utilisés en large gamme d'application dans les réacteurs nucléaires, les équipements de rayonnement et de l'espace. Dans ces environnements, ces matériaux sont souvent exposés aux grandes énergies des rayonnements radioactives, comme les électrons, les protons et les rayons gamma. La structure chimique du matériel isolant est changée par l'irradiation par des mécanismes comme la scission, l'oxydation et la réticulation des chaînes, qui a comme conséquence le changement des propriétés électriques. Les propriétés électriques de ces matériaux seront regardées suivant l'allure temporelle du courant de charge et du courant de décharge pour les conditions de température et champs électrique. L'objectif de ce travail est de voir l'impact de l'irradiation par des rayons gamma sur les propriétés électrique des films PET, de 25µm d'épaisseur, à travers

l'évolution des courants de charge et de décharge, en fonction du temps, à la température ambiante et pour des valeurs de la tension électrique comprises entre 100 et 1000 volts. Les courants de charge présentent une décroissance monotone au cours du temps et leurs amplitudes augmentent avec l'augmentation de la valeur de la tension appliquée et les courants de décharge évoluent dans le même sens que les courants de charge avec une pente constante de l'ordre de 0.6. L'augmentation de la valeur de la densité de courant pour un film PET irradié avec des rayons gamma est une conséquence d'une scission des macromolécules qui réduit le poids moléculaire moyen du PET ce qui conduit à l'augmentation de la mobilité des molécules. En outre, la scission de la chaîne a comme conséquence une diminution du nombre d'électrons de valence en PET, par conséquent une augmentation dans les porteurs de charges libres s'est produite de cette scission qui a augmenté la conductivité de ce matériau. Une simulation numérique des valeurs du champ électrique en fonction du temp

PA57

Investigation of the Paraelectric-Ferroelectric Phase Transition in Bulk and Confined Sodium Nitrite

CEMRE KUSOGLU SARIKAYA[1],HAMIT YURTSEVEN[2]

Middle East Technical University, Department of Physics, 06531, ANKARA-TURKEY

[2]hamit@metu.edu.tr

Levanyuk-Sannikov model was used to describe the ferroelectric-paraelectric transition in bulk and confined sodium nitrite ($NaNO_2$). It was found that this model is suitable to describe the phase transition of $NaNO_2$ for the bulk material which shows first order transition close to the second order whereas confined materialexhibits purely second order transition. Calculations were performed and the fitted parameters were obtained using the model for the ferroelectric-paraelectric transition in $NaNO_2$.

***Keywords**:Ferroelectrics, Levanyuk-Sannikov model, $NaNO_2$.*

PA58

Small angle neutron scattering frommixture of polymers and soft nanoparticles

L. BOUZINA[1], M. DUVAL[2], A. BENSAFI[1], C. Mathis[2] M. RAWISO[2]

[1] Département de Chimie et de Physique Faculté des Sciences,
Université Abou Bekr Belkaid, Chetouane, B.P. 119, 13000, Tlemcen, Algeria
lilabouzina@yahoo.fr

[2] Institut Charles Sadron CNRS-UDS. 23 rue du Loess BP 84047
67034 Strasbourg Cedex 2, France
michel.rawiso@ics-cnrs.unistra.fr

We study the stability and structural properties of mixtures of model nanoparticles and non-adsorbing polymers in the "protein limit" [1,2], where the size of polymers exceeds the particle size substantially. We have synthesized in institute (Charles Sadron Strasbourg) model nanoparticles by coating fullerene C_{60} molecules with low molecular weight polystyrene (PS) chains (6 PS chains with a degree of polymerization close to 25 and 50 are grafted on each fullerene C_{60} molecule [3]. We will present a Small Angle Neutron scattering (SANS) study of Tetrahydrofuran (THF) solutions involving long polystyrene (PS) chains and fullerene (C_{60}) nanoparticles. Long PS chains and C_{60} nanoparticles with different arm lengths were synthesized either hydrogenated or deuteriated. They were characterized through Size Exclusion Chromatography (SEC) and Quasielastic Light Scattering (QLS). In this way, the solubility of the C_{60} nanoparticles in the usual good solvents of PS was controlled. SANS experiments were performed by use of the contrast variation method in order to measure the partial scattering functions related to both components. They allow us to obtain information about the dispersion state of the C_{60} nanoparticles as well as the average conformation of the long PS chains. Specifically, they show that the addition of long polymer chains leads to the existence of an additional attractive interaction in between soft nanoparticles.

***Keywords*:** *fullerenes nanoparticles, protein limit, small angle neutron scattering*

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PA59
ELABORATION D'UN COMPOSITE (Fe-Ni)-CARBURE COMPLEXE PAR FRITTAGE REACTIF ET SA CARACTERISATION

KAHLOUL.L[1], BOUDABENE.S[1]

1: laboratoire de Métallurgie et Génie des matériaux, Département de Métallurgie et Génie des matériaux, Université d'Annaba, B.P12, 23000 (ALGERIE),
l.kahloul@yahoo.fr.

Les matériaux composites à base de nitrures, carbures, oxydes ou autres intermétalliques, sont élaborés habituellement par la voie de la métallurgie des poudres classique. Cependant, elles exigent beaucoup de temps et surtout des dépenses d'énergie élevées, d'où augmentation du prix de revient de ces matériaux [3]. De ce fait, de nouvelles technologies d'élaboration de ces matériaux sont prospectées dans le but de diminuer le nombre d'opérations constituant la gamma de fabrication et par conséquent, d'en réduire le prix de revient. Parmi ces voies, celles mettant en jeu le frittage réactif associé à la compression à chaud, sont des plus prometteuses. Elle présente ainsi l'avantage, relativement au frittage en phase solide classique ou même au frittage en présence d'une phase liquide, d'élaborer et de densifier le matériau en même temps. De ce fait, l'objectif de cette étude est l'élaboration de cermets complexes par frittage réactif sous charge, des mélanges de poudres d'éléments carburigènes (Ti-Cr-W-Mo-Graphite) et du liant métallique (Fe-Ni). Les résultats des investigations ont montré que les températures d'amorçage des effets thermiques (T_d), et de frittage (T_{max}), la structure et la densité relative du matériau, se sont avérées sensibles aux additions de fer – nickel. Le frittage en présence d'un taux croissant de dilution se distingue par un abaissement de T_d et une diminution de l'effet thermique des réactions. La formation des carbures se fait d'une manière incomplète ou sélective. Les carbures de titane et de chrome se sont formés instantanément lors du pic exothermique, par contre, les carbures de tungstène et de molybdène sont le résultat d'une diffusion incomplète du carbone en phase solide. Le maintien isotherme sous charge à 1100°C, a permis d'une part, d'accélérer les mécanismes de densification du matériau par écoulement de matière, et d'autre part

d'achever la formation des carbures. La densité du matériau et sa dureté, dépendront de la teneur du liant. Pour un taux de 50%(Fe-Ni), sa densité relative est de 95%, et sa dureté de 78 HRA.

Mots clés : *Frittage réactif, effets thermiques, carbures, phase liquide, densité, composite*

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PA60

ELABORATION ET CARACTERISATION D'UN COMPOSITE A MATRICE METALLIQUE Fe-Ni.

MEDDAH SOUMAYA[1], BOUDEBANE SAID[2]
[1,2]Laboratoire de métallurgie et génie des matériaux (L.M.G.M)
Université Badji-Mokhtar d'Annaba, B.P12, 23000 (ALGERIE)
soumaya.meddah@yahoo.com

La métallurgie des poudres est souvent sollicitée lorsqu'il s'agit d'élaborer des matériaux inaccessibles par la fusion classique. Parmi ces matériaux, composites à matrice métallique renforcée par dispersion de divers renforts (carbures, oxydes, nitrures, intermétalliques,…..) [1]. Ainsi que, les alliages réfractaires destinés à évoluer à moyenne ou à haute température peuvent être obtenus par cette voie. Ceux à base de Fe-Ni avec des additions d'aluminium et de titane, sont les plus répondus[2].

Nous présentons dans ce travail les résultats de la nitruration de frittés de comprimés d'alliage Fe-20%Ni-1%Mo-6%Al-4% Ti, et les résultats relative à l'étude du comportement à l'oxydation et le comportement tribologique au moyen du test d'usure par abrasion de ces comprimés. Au cours du frittage, ces compositions entrainent la formation d'une phase liquide à base d'aluminium favorisant l'élimination partielle de la porosité ouverte. Notre intérêt s'est porté en premier lieu, sur l'étude de l'influence des additions d'aluminium et de titane sur le caractère de la diffusion, ainsi que sur l'évolution de

la porosité et sur la formation de la structure du fritté, et en second lieu, sur les répercussions de la nitruration sur cette nouvelle structure. Les résultats de l'analyse micrographique ont révélé une nette évolution du caractère de la porosité, avec une tendance à l'élimination des pores ouverts. Au plan structural, le frittage a donné une panoplie d'intermétalliques, conséquence de l'interaction de l'aluminium liquide avec les autres particules solides. Les profils de microdureté ont montré que malgré le caractère sélective de la diffusion de l'azote et du carbone lors de la cyanuration, la saturation s'est fait a cœur, avec la formation d'îlots de AIN, TiC (C, N). Quant aux propriétés, l'apparition des intermétalliques Fe-Al, Ni-Al et Ti-Al lors du frittage, a confère au matériau une bonne tenue à l'oxydation à chaud. La cyanuration modifie le comportement à l'oxydation du matériau et améliore sensiblement sa dureté. Ce qui concerne les résultats du test d'usure, les meilleurs résultats sont obtenus pour la composition à teneur maximale d'aluminium et de titane, le caractère de la dégradation de la surface évolue en présence du traitement thermochimique.

Mots clés : *frittage en phase liquide, porosité, usure, dureté, cyanuration.*

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PA61

CLASSIFICATION DE LA PERMITTIVITEEFFECTIVE DES MATERIAUX COMPOSITES. APPLICATION SUR LES POLYMÈRES CHARGÉS

F. DJERFAF[1], A. Z. MERZOUKI[2]

[1]*Département d'Électronique, Université Amar Telidji – Laghouat, Algérie*

[2] *Laboratoire d'instrumentation scientifique Département d'Électronique, Université Ferhat Abbas – Sétif, Algérie*

fatima_djerfaf@yahoo.fr

Deux méthodes d'analyse factorielle seront utilisées (L'Analyse en Composantes Principales (ACP) et Clustering) dans ce travail. Ces méthodes permettent de réduire la dimension de l'espace des

permittivités effectives avec un minimum de perte d'information. D'une part, l'ACP sert à mettre en évidence des similarités et à repérer les matériaux les plus corrélés. Aussi, de représenter les données dans un espace de dimension réduite. Cette méthode sera appliquée aux corpus des permittivités effectives des matériaux binaires.D'autre part, la méthode Clustering présente une méthode de regroupement des matériaux selon leurs ressemblances (la distance Euclidienne) en groupes homogènes. Ce regroupement est représenté sous la forme d'un arbre de classification.Les matériaux les plus proches seront regroupés selon l'algorithme de Ward. La hauteur à laquelle les matériaux seront reliés correspond à la ressemblance entre leurs permittivités effectives (indice de niveau du nœud). Le niveau de coupure fait apparaître une partition des matériaux composites en classes. Ce niveau sera choisi selon le critère qui assure la bonne qualité d'une partition des permittivités effectives.

Mots clés :*Permittivité effective, matériaux composites, méthodes d'analyse factorielle.*

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PA62

Modélisation et Simulation Pour le MESFET GaAs Avec Une Tension de Pincement Elevée

C.KADDOUR[1] , C .AZIZI [2] , S.KHEMISSI [3] , M .ZAABAT et Y .SAIDI

[1]*Département des Sciences de la Matière, Université Larbi Ben M'hidi , Oum El Bouaghi ,Algérie.*

anakadd@yahoo.fr

[2] *Département des Sciences de la Matière, Université Larbi Ben M'hidi , Oum El Bouaghi ,Algérie.*

Dans cette communication nous proposons un modèle analytique du MESFET GaAs [1]. Il est valable pour les composants MESFET GaAs qui ont une tension de pincement élevée Vp > 3V. Dans ce cadre et à partir des expressions analytiques qui nous avons obtenus ¸un

programme de simulation a été mis au point et appliqué à certains composants .Les résultats théoriques obtenus ont été comparés à ceux de l'expérience[2].

Mots clés : *MESFET GaAs , Modéle Analytique , Propriétés Statiques , Modélisation du transistor MESFET GaAs.*

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PA63

MODELISATION DU COMPORTEMENT DIELECTRIQUE DES MATERIAUX TYPEPOLYSTERES CHARGES PAR DES TITANATES

A. Z. MERZOUKI[1] , F. DJERFAF[2]

[1] Laboratoire d'instrumentation scientifique Département d'Électronique, Université Ferhat Abbas – Sétif, Algérie

[2] Département d'Électronique, Université Amar Telidji – Laghouat, Algérie

fatima_djerfaf@yahoo.fr

Ce travail présente, la modélisation diélectrique des matériaux binaires par l'utilisation des réseaux de neurones artificiels. Le modèle du réseau de neurones possède trois couches. Ce modèle utilise un apprentissage neuronal de type rétro propagation. Les matériaux traités sont de type polystères chargés par les titanates $MTio_3$ (avec M=Ba, Sr, Ca et Mg). Une confrontation entre l'expérimental et les résultats de deux méthodes (les réseaux de neurones et la récente loi de modélisation). L'ensemble des résultats obtenus, confirmera que les réseaux de neurones, apportent une solution pour quelques problèmes de la modélisation diélectrique (permittivité du matériau binaire ε_{12} en fonction de la concentration volumique V_2) des matériaux binaires, et également aux problèmes de la prédiction du comportement diélectrique pour les fractions volumiques souvent inaccessibles à la mesure. Nous satisferons d'une part, l'amélioration de la précision et d'autre part, la prédiction du comportement diélectrique des matériaux binaires.

Mots clés : *Modélisation, Permittivité effective, matériaux binaires, réseaux de neurones.*

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PA64

Dynamique de la charge piégée dans les isolants à partir de la méthode Miroir

S. FAKHFAKH[1], O. JBARA[2], Z. FAKHFAKH[1]

[1] LaMaCop, Faculté des sciences de SFAX, Route Soukra Km 3, BP 1171, C.P 3000 Sfax Tunisie.

slimfakhfakh@yahoo.fr

[2]Laboratoire d'Ingénierie et Sciences des Matériaux (LISM) EA 4695, UFR Sciences Case 18BP 1039, 51687 Reims Cedex 2 - France

La méthode miroir est souvent qualifiée de statique car le temps de mesure est relativement grand par rapport aux constantes de temps des phénomènes de charge observés. Cette méthode permet habituellement de mesurer la quantité de charge piégée maximale susceptible d'être stockée dans un isolant. En effet, pendant la période (de l'ordre de quelques secondes) qui sépare l'étape de mesure (obtention de l'image miroir) de la fin de celle de l'injection de la charge, une décharge partielle peut se produire entraînant une décroissance de Q. Ainsi la valeur de la charge mesurée ne reflétera pas la quantité de charge effectivement piégée pendant l'étape d'injection mais seulement ce qu'il en reste après la décharge. En tenant compte de ces considérations, nous proposons dans ce travail une nouvelle procédure expérimentale permettant de rendre la méthode miroir comme une méthode dynamique capable de déterminer l'évolution temporelle de la charge piégée au sein d'un matériau isolant. Pour cette méthode, les courbes $1/d = f(V_{Obs})$ sont ajustées selon un modèle établi pour une distribution de charge

uniformément réparti à la surface d'un disque. Dans le but de comparer les résultats obtenus à partir de cette nouvelle procédure avec la méthode basée sur l'influence électrostatique, nous avons opéré avec les mêmes conditions expérimentales (mêmes tensions d'accélération (ou énergies primaires), même courant primaire et même distance de travail). Les résultats obtenus à partir des deux méthodes sont en bon accord.

Mots clés *: Isolant, Charge piégée, Méthode miroir.*

PA65

Influence des propriétés électriques et optiques des films ZnO sur les performances d'un photodetecteur Metal-ZnO-metal

Ghania HARZALLAH, Mohamed REMRAM

Laboratoire Lemeamed, Université Mentouri Constantine Algerie

moh_remram@yahoo.fr

Le ZnO avec ces excellentes propriétés est potentiellement utilisé dans les dispositifs optoélectroniques ultra-violets (UV), en particulier pour les photodétecteurs MSM UV . Dans ce travail, nous présentons un modèle théorique d'un PD MSM à base de ZnO avec un contact métallique interdigité en aluminium [1]. Le modèle est bidimensionnel de type de dérive de diffusion basé sur les équations de continuité, l'équation de Poisson et les équations des courants. Ce modèle présente le caractère bidimensionnel du PD MSM et il nous permet d'étudier le comportement du photodétecteur MSM [2]. Nous avons considéré dans le premier courant d'obscurité, où nous avons considéré l'influence de propriétés électriques du ZnO déposé avec la technique de pulvérisation cathodique radio fréquence. Ces propriétés électriques dépendent de recuit thermiques [3]. Les résultats montrent que le courant d'obscurité ne présente pas de changements importants avec des couches de ZnO recuits à différentes températures (figure 1).

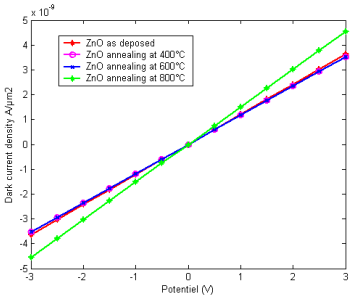

Figure 1: Evolutiondu courant d'obscurité en fonction de la polarisation pour différents films de ZnO .

Par contre, si on soumet notre dispositif a une irradiation d'une puissance de 30 µW correspondant à une longueur d'onde appartenant à la gamme de l'ultraviolet (365nm=□) ; nous avons obtenu un photocourant qui varie en fonction des températures des traitements thermiques de nos échantillons. Une nette amélioration de la responsitivité de nos dispositifs est constatée.

Mots clés :*Photodetecteur MSM, ZnO, modélisation*

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PA66

Optical properties of indium containing dielectric glassy films

P.PETKOV[1], P.ILCHEV[2], T.PETKOVA[3]

[1] Thin Films Technology Lab., Departments of Physics, University of Chemical Technology and Metallurgy, Kl.Ohridsky Blvd.8, 1756 Sofia, Bulgaria

p.petkov@uctm.edu

[2]Sensata Technologies Group, 2140 Botevgrad, Bulgaria

[3]Institute of Electrochemistry and Energy Systems, B A S, Acad.G.Bonchev Bl.10, 1113 Sofia, Bulgaria

Chalcogenide glasses of $(GeSe_5)_{1-x}In_x$ with 5,10,15,20 mol % In have been investigated. The correlations between the composition and properties of the

glasses are discussed with the view of structural transformation in the glassy matrix. The processes of vacuum evaporation and condensation in the glassy Ge-Se-In system were studied. The thin films deposited under the conditions used are amorphous and without 3D defects proved by TEM analysis. The optical spectra of the thin films have been studied with a view to understanding the role of indium on the film behaviors. An optical characterization method, based on the transmission and the reflection spectra at normal incidence of uniform, thin films, has been used to obtain the thicknesses and optical constants corresponding to the as-deposited and annealed samples. The dispersion of the refractive index is discussed in terms of the single-oscillator Wemple-Di Domenico model. The absorption behaviors are described using both the Urbach rule and the 'nondirect transition model proposed by Tauc. The variations in the refractive index, the band gap, and the oscillation energy of the films after annealing are discussed with respect to rearrangement of the main structure units.

Keywords: *chalcogenide glasses, thin films, optical properties, chemical sensors*

PA67

Crystal structure, Vibrational study, phase transitions and electrical properties of 4-benzylpyridinium monohydrogenselenate

Wassim MAALEJ[1], Tahar MHIRI[1]and Zakaria ELAOUD[1*] .

[1]Laboratoire de Physico-Chimie de l'Etat Solide, Département de Chimie, Faculté des Sciences de Sfax, BP 1171, Route de Sokra km 3.5, 3000 Sfax, Université de Sfax, TUNISIA

zakaria_elaoud@yahoo.com

The salt 4-benzylpyridinium monohydrogenselenate $C_6H_5CH_2C_5H_4NH^+.HSeO_4^-$(4-BSe) is orthorhombic *Pbca* with the following unit cell dimensions: a = 27.449(5) Å;b = 10.821(6) Å and c = 8.830(1) Å [1]. The structure consists of infinite parallel two-dimensional planes built of $HSeO_4^-$ anions and $C_6H_5CH_2C_5H_4NH^+$ cations mutually. Differential scanning calorimetry study on 4-BSe was carried out. . DSC and electric measurements revealed a high temperature phase transition at 363K. The Raman of polycrystalline sample of 4-BSe has been recorded at different temperature between 297 and 373K. The conductivity relaxation parameters associated with some H^+ conduction have been determined from an analysis of the M"/M"max spectrum measured in a wide temperature range. An appearance of the superionic phase transition in 4-BSe is closely

related to a liberation or even a rotation increase of XO_4 groups with heating [2].

***Keywords**: Crystal structure, Phase transitions; Raman; Impedance; Complex dielectric.*

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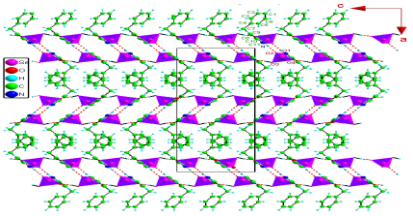

PA68

Study of the geometric parameters and utilization limitsof the microelectronic capacitive pressure sensor

S. BOUGUIMA [1], N. BENMOUSSA, B. BENYOUCEF

Unité de Recherche Matériaux et Energies Renouvelables

Université Abou-Bakr Belkaîd – Tlemcen – ALGERIE

[1]Email : ***soub580@yahoo.fr***

The response in static regime of the microelectronic capacitive pressure sensor whose sensible element is a fine *silicon membrane* with oblong or square shape is studied with low distortion hypothesis. This response, represented by the capacity according to the pressure, presents two zones: a nearly linear zone corresponding to the values of PN lower than 0,6 and second one highly non linear for values of PN higher than 0,6. *To* improve the linearity and the sensitivity, we studied the sensors with fixed armatures of different geometries: full and hollowed. However, we showed that the reduction of the surface of the fixed armature involves a loss of sensitivity but a gain in linearity. On the other hand the extension of the hollowed surface of this armature increases the linearity but decreases considerably the sensitivity. Then, we showed the sensitivity of the response to the sensor geometric parameters. The representation of constraints

allowed respectively to determine the most constrained points of the membrane and to determine the limit elastic pressure.

***Keywords**: microelectronic capacitive pressure sensor, capacity, geometric parameters.*

PA69

Study of relaxor and classical ferroelectric ceramics: a structural approach

Meryem BOUZIANE[1], Mehamed TAIBI[2] and Ali BOUKHARI[1]

[1] Laboratoire de Chimie du Solide Appliquée, Faculté des Sciences, Université Mohammed V-Agdal, Avenue Ibn Batouta, BP 1014, Rabat, Morocco.

bouzianemeryem@yahoo.fr

[2] Laboratoire de Physico-Chimie des Matériaux (LAF 502), Ecole Normale Supérieure, Université Mohammed V-Agdal, BP 5118, Rabat, Morocco.

The ferroelectric properties of $Pb_2Na_{1-x}La_xNb_{5-x}Fe_xO_{15}$ ($0 \leq x \leq 1$) ceramics crystallising with the tungsten bronze (TB) vary with x. When x is smaller than 0.35, the materials exhibit a typical ferroelectric – paraelectric transition. For larger values, a relaxor behaviour has been evidenced. This behaviour was attributed to the presence of disorder in cationic sites. In the light of these results, $Pb_2Na_{1-x}La_xNb_{5-x}Fe_xO_{15}$ with x = 0.2 and 0.8 were refined by the Rietveld method from X-Ray powder diffraction recorded at room temperature and characterized by Raman spectroscopy. The first composition is found as a classical ferroelectric; in contrast, the second one presents a relaxor behaviour.For x = 0.2, the cell is orthorhombic with non-centrosymmetrical space group Cm2m. The lattice parameters a = 17.6053(39) Å, b = 17.8245(60) Å and c = 3.8698(02) Å. For x = 0.8, the lattice is tetragonal with space group P4/mbm and cell parameters are a = b = 12.4911(97) Å and c = 3.8932(22) Å. In the frequency range 200 - 1000 cm^{-1} three main A_1 phonons around 240(υ_1), 630(υ_2) and 816 (υ_3) cm^{-1} were observed. The broadening of the Raman lines for high values of x originates from a significant structural disorder. This result is in good agreement with the relaxor character of theses compositions. The lowest-frequency part of the spectra (below 180 cm^{-1}) reveals a structural change in the studied solid solution. Finally, the ionic disorder resulting from this titled substitution perturbs the long range polarization giving rise to ferroelectric relaxor behaviour.

PA70

Analysis of current–voltage and capacitance–voltage characteristics of Hg/InN/InP Schottky barrier diodes

K. AMEUR[1,*], Z. BENAMARA[1], H. MAZARI[1], N. BENSEDDIK[1], R. KHELIFI[1],
M. MOSTEFAOUI[1], N. BENYAHYA[1], B. GRUZZA[2]

[1]: Laboratoire de Microélectronique Appliquée, Université Djillali Liabès de Sidi Bel Abbés, 22000 Sidi Bel Abbés, Algérie.

[2]: Laboratoire des Sciences des Matériaux pour l'Electronique et d'Automatique, Université Blaise Pascal, Les Cézeaux, Clermont II, France.

kheira_ameur@yahoo.fr

In this paper, electrical characterization and analytical modeling of current-volatge I(V) and capacitance-voltage C(V) for Hg/InN/InP Schottky structures are investigated. We have studied electrically thin InN films realized by the nitridation of InP(100) substrates using a Glow Discharge Source (GDS) in ultra high vacuum. *So,* we have calculated, using I-V and C-V measurements, the ideality factor n, the saturation current I_s, the barrier height ϕ_B, the series resistance R_s, the interface state density N_{ss},the doping concentration N_d and the diffusion voltage V_d. We have also established an analytical calculation program of I(V) and C(V) curves in order to determine the effect of the interface layer InN and serial resistance R_s on the calculated parameters.

Keywords: *InN, InP(100), Electrical measurements, Analytical modeling.*

PA71

Disordered phase of 1,3-dibromo-5-chloro-2,4,6-trimethyl-benezene at 293 K

Soumia GHANEMI[1], Olivier JEANNIN[2], Jean MIENNEL[2], Ali BOUDJADA[1]

[1] Laboratoire de Cristallographie, Département de Physique, Université Mentouri Constantine 25000, Algeria

ghanemisoumia@yahoo.fr

[2]UMR 6226 CNRS-Université Rennes 1'Sciences chimiques de Rennes', Equipe ' Matière condensée et systèmes Electroactifs', Bâtiment 10C, Campus De Beaulieu, 263 Avenue Du Général Leclerc, F-35042 Rennes, France

Halogenomethylbenezenes in particular trihalogenomesitylenes are considered as prototype systems for studying the quantum-rotational tunneling of methyl groups [1]. In addition, they own interesting

properties of phase transitions due to dynamic reorientation of the molecules in their plane. Because of these, it is of great interest to establish the crystal structures of these compounds. Only tribromomesitylene (TBM) [2] and triiodormesitylene (TIM) [3] have been characterized so far. They crystallize at room temperature in the triclinic space group P 2/n (Z=2). Replacing one halogen substituent by another one; the idealized symmetry of the isolated molecule (ignoring H atoms) decreases from D_{3h} to C_{2v}. In order to establish for the trihalogenomesitylene series the impact of small changes on the molecular symmetry, we report here the crystal structure of 1,3-dibromo-5-chloro-2,4,6-trimethyl-benezene (DBCM) at 293 K, obtained by single-crystal X-ray diffraction.In the crystal state at room temperature, the molecule of dibromochloromesitylene (1,3-dibromo-5-chloro-2,4,6-trimethyl-benezene) present a disorder involving carbon and halogen sites (occupied identically by 50% C, 33% Br , 17% Cl). This disorder, of the rotational type according to previously published NMR measurements, corresponds to fast 2π/6 stochastic in plane reorientation of the molecule between three discernable locations. This kind of rotational disorder can be revealed for the first time by diffractometry thanks to the C_{2v} in the title compound.

***Keywords**: Trihalogenomesitylene, X-ray diffraction, Disorder.*

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PA72

SYNTHESE ET CARACTERISATION DE COMPOSESFERROELECTRIQUES DE STRUCTURE PEROVSKITE

H. MSOUNI[a], M.ELAATMANI[a], M.ELHAMMIOUI[b], A.OUTZOURHIT[c], A.TACHAFINE[d],A. ZEGZOUTI[a] et J-C. CARRU[d]

[a]Equipe Sciences des Matériaux Inorganiques et Applications, Faculté des Sciences Semlalia, Université Cadi Ayyad, Bd. My Abdallah, BP 2390 Marrakech, Maroc

houda.msouni@gmail.com

[b] *Laboratoire Réactivité des Matériaux et Optimisation des Procédés, Faculté des Sciences Semlalia, Université Cadi Ayyad, Bd. My Abdallah, BP 2390 Marrakech, Maroc*
[c] *Laboratoire de physique du Solide et des Couches Minces, Faculté des Sciences Semlalia, Université Cadi Ayyad, Bd. My Abdallah, BP 2390 Marrakech, Maroc*
[d] *Unité de Dynamique et de Structure des Matériaux Moléculaires, Université du Littoral- Côte d'Opale, 50 rue F. Buisson, B.P. 717, 62228 Calais ,France*

Le titanate de baryum $BaTiO_3$ (BT) est un matériau ferroélectrique dont les propriétés diélectriques sont étudiées depuis de nombreuses années. Il est stable chimiquement et peut être fabriqué sous forme monocristalline ou polycristalline (céramique). Ce matériau reste toujours, malgré les nombreuses études déjà parues, un matériau très étudié notamment pour l'amélioration de ses propriétés diélectriques par dopage ou substitution, permettant ainsid'ajuster les propriétés du matériau pour une application précise. [1], [2], [3]. Dans ce travail, nous nous sommes, d'une part proposés d'élaborer de nouveaux matériaux dérivant du titanate de baryum en vue d'amplifier les propriétés diélectriques , et d'autre part intéressés aux différents paramètres qui pourraient interférer avec les propriétés diélectriques de notre matériau d'origine en passant par la substitution, le dopage ainsi que la taille des particules. Plusieurs substitutions sont effectuées au niveau des différents types de sites cristallographiques pour mettre au point différentes solutions solides de compositions chimiques variées. L'analyse par diffraction des Rayons X montre des phases bien cristallisées dont certaines nécessitent un recuit à des températures élevées. Les mesures diélectriques sont en cours.

Mots-clés : *titanate de baryum, céramique, substitution, propriétés diélectriques.*

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PA73
Rehydration mechanisms in collagen as seen by thermally stimulated current

N. BENREKAA, R. SAOUD, Z. GUEBAILI, A. ABDALLAH, I. BAYOU, C.A. GUERBI

Department of Materials Physics, Faculty of Physics, University of Sciences and Technologies USTHB, BP 32, El Alia, 16111, Algiers, Algeria

nbenrekaa@usthb.dz, nbenrekaa@gmail.com

The objective of this work is to suggest a quantitative model of natural skin aging. This model is expected to carry out tests for pharmaceutical or cosmetic products to achieve skin firmness purposes. We have defined an experimental protocol to highlight mechanism of rehydration and molecular mobility of collagen. Thermally stimulated currents in skin collagen have been investigated in the temperature range of -180°C to 60°C. We highlighted principally two types of molecular movements. α relaxation mode at approximately 20°C is associated with intermolecular mobility of tropocollagen molecules. Intermolecular mobility of polar sequences characterized by β relaxation mode is highly sensitive to hydration. This mode shows in the hydrated state two components: β1 and β2. During dehydration, there is firstly a significant decrease in the intensity of α and β1 modes and the disappearance of the β2 sub-mode. Finally, γ mode registered at -160°C is associated with non-polar amino acids.

Keywords : *Thermally stimulated current; collagen; TSDC method*

PA74
Modélisation et simulation numérique de l'écoulement d'un fluide non newtonien.
Cas de l'écoulement du sang à travers une artère sténosée

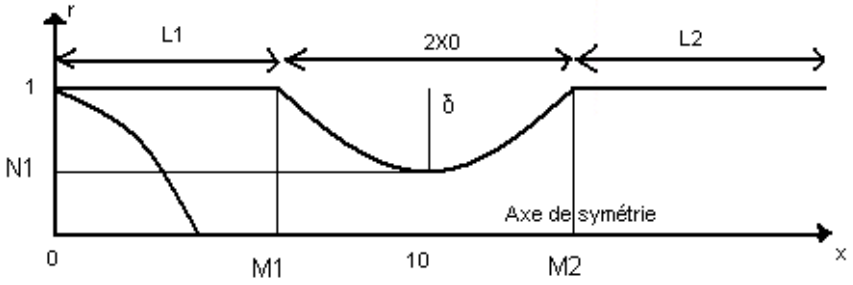
TOUIL Mehamed[1], HASSAN Rabaâ[1]

[1]DEPARTEMENT DE CHIMIE, ESCTM, UNIVERSITE IBN TOFAIL, P.O. BOX 133, KENITRA 14000, MAROC

Touil_mhamed@yahoo.fr

L'objectif de ce travail est double : Modélisation du comportement rhéologique du sang par deux lois constitutives donnant la variation de

la contrainte de cisaillement en fonction de la vitesse de cisaillement, afin d'approcher la courbe expérimentale et de comparer les deux modèles; simulation numérique par la méthode des éléments finis de l'écoulement non newtonien du sang à travers une artère sténosée. On montre que la prise en compte du comportement non newtonien du sang entraîne des changements non négligeables dans la structure de l'écoulement.



Géométrie de l'artère sténosée

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PA75

Rôle des agents de couplage dans les matériaux composites polypropylène/carbonate de calcium

N. GHARZOULI[1], R. DOUFNOUNE[2], N. HADDAOUI[1]

[1] Laboratoire de Physico-chimie des Hauts Polymères (LPCHP)
Département de génie des procédés, Faculté de Technologie, UFAS, Sétif, Algérie
[2] Unité de Recherche des Matériaux Emergents-Sétif- (URMES),
Valorisation des matériaux polymériques, UFAS, Sétif, Algérie
ngharzouli@yahoo.fr

L'intérêt croissant des polymères a fait l'objet de beaucoup d'études menées dans ce domaine qui ont clairement mis en évidence le rôle joué par les aspects de surfaces et de formes des renforts et de leur dispersion. Combiner les avantages des charges particulaires et ceux d'une phase thermoplastique peuvent conduire à de nouvelles applications par l'amélioration de certaines

propriétés. L'investigation de notre étude a porté sur des composites à base de polypropylène (PP) et de carbonate de calcium ($CaCO_3$) modifié par deux organosilanes et un organozirconate dans le but de moduler les interactions développées à l'interface entre les deux constituants, afin d'améliorer la compatibilité des matériaux étudiés.Néanmoins pour pouvoir contrôler la rhéologie du polypropylène et améliorer l'adhésion à l'interface PP/$CaCO_3$,l'introduction du peroxyde organique dans les différents mélanges s'est avérée nécessaire. L'étude des propriétés rhéologiques en régime permanent a conduit à la connaissance des lois d'écoulement, elle a permis de mettre en évidence le caractère pseudo plastique très marqué des composites par rapport à la matrice vierge.

Keywords*:Polypropylène (PP), carbonate calcium ($CaCO_3$), agents de couplage, peroxyde*

PA76

Effet de l'adsorption d'oxygènesur la variation de la résistance électrique de couches minces de ZnO et de CdeSe

A. HADDAD, A. HAFIDI, N. CHAHMAT et M. GHERS

Laboratoire d'Etude des Surfaces et Interfaces de la Matière Solide - L.E.S.I.M.S.
BP 12 Département de Physique - Faculté des Sciences,
Université BADJI Mokhtar Annaba - Algérie

E-mail : ***haddadammar@yahoo.fr***

Les matériaux qui ont servi à l'étude sont des couches de ZnO et de CdSe. Ils se caractérisent par un comportement de semi-conducteur. Celles de CdSe ont été obtenues par co-évaporation, sous vide, de cadmium et de sélénium. Les échantillons de ZnO ont été élaborés par oxydation, à 450°C, de zinc déposé par évaporation sous vide dans les mêmes conditions que celles de CdSe. Les matériaux des deux types ont été déposés sur des plaquettes en verre puis recuit à 350°C pour stabilisation. Des essais d'adsorptions d'O_2 à différentes températures montrent des variations considérables de leur résistance électriques R. Les résultats mettent en évidence des domaines de température de plus haute sensibilité à l'oxygène. Pour le CdSe, certaines désorptions isothermes ont été suffisantes pour une régénération totale des échantillons. Les couches de ZnO ont souvent nécessité des désorptions programmées (D.P.T) en température, pour leur restauration à l'état initial, après ionosorption d'O_2. L'exploitation des couches de variation de R en cours de D.P.T permet de déterminer les énergies mises en jeu. Un gaz réducteur s'adsorberait par réduction de l'oxygène ionosorbé, et provoque un effet inverse sur la conduction, telle qu'une augmentation de la conductivité superficielle ou une diminution de la résistance d'un matériau semi –

conducteur de type n. Ces variations sont importantes lorsque la concentration d'oxygène ionosorbé est grande, donc dans les domaines de températures de plus haute sensibilité à l'oxygène. Ce mécanisme serait révélateur de la présence d'un gaz réducteur dans l'atmosphère et la surface d'un semi-conducteur pourrait servir d'élément sensible d'un détecteur de gaz.

Mots clés *:couches semi-conductrices, conductance, désorptions isothermes, gaz.*

PA77

Modélisation des chemins de conduction des cations monovalents décrit par le modèle BVS pour les composés $A^{I}Sc(HAsO_4)_2$, où (A^{I}= K et Cs).

N. OUERFELLI[*] ; M.F. ZID

Laboratoire de Matériaux et Cristallochimie, Faculté des Sciences de Tunis, Université de Tunis El Manar, 2092 El Manar II Tunis, Tunisie

[*] *: **najouerf@yahoo.fr***

Dans le but de prévoir les performances électriques d'un matériau ou de mieux interpréter les résultats des mesures de la conductivité électrique et de les relier aux structures cristallines, le modèle des états de valence *(Bond Valence Sum BVS)* [1,2] semble être un outil facile et fiable [3,4].

L'intérêt de cette modélisation est de traduire sous forme graphique les relations entre la structure cristalline et la mobilité ionique des matériaux $A^{I}Sc(HAsO_4)_2$, où (A^{I}= K et Cs), afin de prévoir leurs performances électriques. En d'autres termes trouver les chemins de conduction les plus probables pour qu'un cation pouvant se déplacer dans un réseau anionique. L'analyse BVS est basée sur les corrélations empiriques entre la distance interatomique R(i,j) (Å) d'une liaison entre deux atomes i et j et la valence s(i,j) (u.v.) [1] de la liaison chimique dans la structure cristalline.$\boldsymbol{S_{(ij)} = exp\,[(R_o - R_{ij}) / b]}$, R_0 et b sont des constantes dont les valeurs sont tabulées pour la plupart de couples cations-anions.Par cette modélisation, nous calculons la valence qu'un cation l'aurait s'il sera placé dans une position arbitraire M(x,y,z) dans le réseau cristallin, les points de départ étant les positions cristallographiques et le mouvement libre s'est produit le long de certaines directions initiales de migration. Le résultat ainsi obtenu est sous forme graphique donnant la somme de valence en fonction de la distance parcourue, on peut dans certains cas identifier les trajectoires les plus probables qui correspondent aux points ayant les valences minimales, les valeurs élevées correspondent à des barrières énergétiques.Le couplage de l'analyse structurale avec le modèle BVS est appliqué aux composés

$KSc(HAsO_4)_2$ et $CsSc(HAsO_4)_2$. Le résultat ainsi obtenue va être discuté et reste à être vérifié par des mesures expérimentales.

Mots clés : *Arséniates ; monocristaux; composés inorganiques; simulation des chemins de conduction par le modèle BVS.*

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PA78

Modélisation des structures magnéto-optiques 1D par la méthode FDTD

O.ARAR[1*], O. LAMROUS[1], D. VAN LABEKE[2], F.I. BAIDA[2]
*** *ouiza_ar2002@yahoo.fr***
[1]Faculté des sciences, Laboratoire LPCQ, Université Mouloud Mammeri de Tizi-Ouzou Algérie.
[2]Institut FEMTO-ST, UMR CNRS 6174, Université de Franche Comté, 25030 Besançon, France

Cette étude a pour objectif la modélisation de dispositifs optiques à base de matériaux magnéto-optiques. Elle s'appuie sur l'implémentation d'un code numérique utilisant la méthode des différences finies dans le domaine temporel (FDTD : Finite Difference Time Domain). L'application considérée porte sur une structure magnéto-optique 1D composée d'un empilement périodique de couches, d'épaisseur de l'ordre de la longueur d'onde. Cette structure est supposée infinie suivant les deux directions x et z et le motif élémentaire, composé de trois couches d'indices différents, se répète dans la direction y. La première est un pur diélectrique de permittivité 2.1 et d'épaisseur 0.2a (a étant la période du réseau) et les deux autres présentent des propriétés magnéto-optiques et admettent une même épaisseur de 0.4 a. Les éléments diagonaux de leur tenseur de permittivité sont égaux à 6.25 alors que l'effet magnétique, apparaissant sous forme de termes non diagonaux dans ce tenseur, correspondent à un coefficient gyrotropique de g_1=0.6 et g_2=-0.6 pour l'une et l'autre des deux couches. Cet effet magnéto-optique est supposé être induit par application d'un champ magnétique statique extérieur Hz dirigé vers les z positifs pour l'une des couches et vers les z négatifs pour l'autre. Ceci explique le signe contraire des deux coefficients.

Cette structure est alors éclairée par une onde plane suivant la direction y. Les courbes de dispersion et d'iso-fréquences ainsi établies montrent l'existence d'une non-réciprocité entre les deux directions de propagation (y>0) et (y<0). Elle a été proposée [1] dans le cadre d'une possible utilisation en tant que miroir unidirectionnel.

***Mots clés**:FDTD anisotrope, Structure magnéto-optique, Cristaux photoniques*

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PA79

Electrical characterization of Au/GaN, Hg/GaN and Pt/GaN Schottky diodes

R. KHELIFI[1], H. MAZARI[1], S. MANSOURI[1], K. AMEUR[1], Z. BENAMARA[1], M. MOSTEFAOUI[1], N. BENSEDDIK[1], N. BENYAHYA[1],P. RUTERANA[2], I. MONNET[2], J. M. BLUET[3]

[1]Laboratory of Applied Microelectronics, Department of Electronics,Djillali Liabès University of Sidi Bel-Abbes, 22000 Sidi Bel-Abbes, Algeria.

[2]Centre for Research on Ions Materials and Photonics, CIMAP UMR 6252 CNRS ENSICAEN-CEA-UCBN, 14250 Caen Cedex France.

[3]University of Lyon, Lyon Institute of Nanotechnology, INL-UMR5270, CNRS, INSA Lyon, Villeurbanne F-69621, France

reski_k81@hotmail.fr

In this work, we conducted a comparative study of the electrical parameters determined from current-voltage (I-V) and capacitance-voltage (C-V) characteristics of Au/n-GaN, Hg/n-GaN and Pt/n-GaN structures[1-2]. Analysis of I(V) curve of the structure Au/n-GaN showed a ideality factor, a barrier height and an series resistance of the order of 1.02, 0.65 eV and 84 Ω respectively. For the structure of Hg/n-GaN, the calculated values are respectively 1.13, 0.65 eV and 670 Ω.While the determined values of Pt/n-GaN structure are 1.75, 0.77 eV and 312 Ω, respectively. The barrier heights and doping concentrations determined from C(V) curves are of the order of 1.17 eV and 8.16×10^{16} cm^{-3} for the Au/n-GaN Schottky diode, 1.34 eV and 1.87×10^{16} cm^{-3} for Hg/n-GaN Schottky diode and 1.22 eV and 4.72×10^{17} cm^{-3} for Pt/n-GaN Schottky diode.

***Keywords**: GaN,Electrical characterization, Schottky diode.*

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PA80

New Approach for the Modelling of trapping Charge Process in Electron Irradiated Dielectric Materials

Nouha GHORBEL[1],Ali KALLEL[1], Gilles DAMAMME[2]

[1] LaMaCop, Faculté des sciences de Sfax,
Route Soukra Km 3, BP 802, C.P 3038 Sfax Tunisie
ghorbel_nouha@yahoo.fr

[2] CEA-GRAMAT, BP 80200, 46500 CRAMAT – France

Trapping and detrapping of charges in insulators have been the subject of numerous experimental studies during these last years, in association with their technological applications, such as the deterioration involved by the dielectric breakdown or flashovers[1-4].Several techniques are nowadays accessible to study the spatial distribution charge in ceramics or polymers bombarded in a Scanning Electron Microscope (SEM) such as the mirror method and the induced current. In this present work, we propose to investigate through a new approach, the charging of insulators under electron irradiation, which is based on the measurements of the secondary electron emission (SEE) and induced current. So, we study in a first part, the influence of the crystallographic direction in a ceramic type (MgO) on the trapping properties. We develop then the experimental measurement of the secondary electron emission which proves of a great interest and very relevant for any study aiming at approaching the state of dielectric material. In fact, the semi-logarithmic plot of the SEE ratio versus the density of trapped charges shows a linear decrease which can be associated to the microscopic cross section for electron trapping in defects.

Keywords*: Insulator, trapping charge, secondary electron emission, induced current.*

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PA81
EFFECT OF SILANE TREATMENT ON THE MECHANICAL, THERMAL AND MOPHOLOGICAL PROPERTIES OF SHORT SPARTIUM JUNCEUM FIBERS REINFORCED POLYPROPYLENE COMPOSITES

S. NEKKAA [*], M. GUESSOUM, S. IKHLEF and N. HADDAOUI
Laboratoire Physico-Chimie des Hauts Polymères, Département de Génie des Procédés, Faculté de Technologie, Université Ferhat Abbas Sétif 19000. Algeria
s_nekkaa@yahoo.fr

Vegetables fibers have attracted much attention recently for use as reinforcing agents in composite materials. The advantages of vegetables fibers over their traditional counter-parts include: relatively biodegradability, lower density and lower cost[1]. However, the main disadvantage of vegetables fibers is their hydrophilic nature that lowers the compatibility with hydrophobic polymeric matrix during composite fabrication. Due to the poor compatibility, surface of vegetables fibers must be treated to form bonds between the fillers and the polymer matrix [2].The objective of the present work is to fabricate composites from raw and chemically treated Spartium junceum fibers and polypropylene (PP/SJ) and subsequently investigate the effects of chemical treatment on the mechanical, thermal and mophological properties of PP/Spartium junceum fibers composites. The surface modification of Spartium junceum fibers was carried out using silane coupling agents in order to improve the interfacial adhesion between the fiber and the matrix. DSC measurements showed that the incorporation of Spartium junceum fibers caused an increase in the crystallinity of the matrix. These effects have been attributed to the fact the surface of Spartium junceum fibers acts as nucleating agents for the crystallization of the polymer, promoting the growth and the formation of transcrystalline regions around the fibers.

Keywords: *Polymer composites, Polypropylene, Spartium Junceum fibers, Surface treatment, Thermal properties.*

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PA82

Nanocomposites PVC/NBR/$CaCO_3$: Stratégie d'élaboration et de fonctionnalisation de surface en vue d'améliorer les propriétés mécaniques et thermiques du mélange

DOUFNOUNE Rachida[1], GUEZZOUT Zahir[1] and HADDAOUI Nacerddine[2]
[1] Unité de Recherche des Matériaux Emergents –Sétif- URMES, Valorisation des Matériaux Polymériques
Université Ferhat ABBAS (Sétif –Algérie-), Route de Bejaia, Sétif, 19000, Algeria
doufnoune@yahoo.fr
[2] Laboratoire de Physico-Chimie des Hauts Polymères (LPCHP),
Département de génie des procédés, Faculté de Technologie, Sétif, Algeria

Les nanocomposites à matrice polymère et à renforts particulaires constituent une classe très importante en raison des applications innovantes que laissent entrevoir leurs propriétés physiques et chimiques. Dans ces systèmes, la dispersion ultrafine et les interactions locales entre matrice et renfort permet d'augmenter de façon substantielle la performance des matériaux obtenus.Le polychlorure de vinyle est le polymère qui offre probablement le meilleur rapport prix/performance parmi toutes les polyoléfines. C'est l'un des matériaux les plus utilisés après le polyéthylène et le polystyrène. Les nombreuses formulations possibles fournissent la possibilité de mettre en œuvre des matériaux très spécifiques en fonction de l'application désirée[1]. Le polychlorure de vinyle est très rarement employé seul. Un mélange plus ou moins souple contient une série d'adjuvants qui ont une importance extrême sur ces propriétés techniques. Dans ces formulations interviennent des plastifiants, des stabilisants, des lubrifiants et enfin des charges qui peuvent influer grandement sur les propriétés mécaniques des produits finis.Parmi les charges utilisées, il faut citer le carbonate de calcium ultrafin. Néanmoins, la nature chimique de ce type de charge, très

différente d'ailleurs de celle du milieu de dispersion défavorise son incorporation et sa compatibilité. Ce travail a pour objectif d'étudier l'effet associé d'une charge rigide ($CaCO_3$) et d'une phase élastomère (NBR) sur les propriétés mécaniques et thermiques du polychlorure de vinyle (PVC). L'investigation porte sur le mélange binaire (PVC/NBR) dans la proportion (70/30). Les nanocomposites ont été réalisés à l'état fondu et le comportement mécanique en traction ainsi que les propriétés thermiques ont été examinés.Les résultats obtenus montrent que les propriétés sont grandement influencées par la composition. Une amélioration significative des propriétés est obtenue pour une teneur massique en $CaCO_3$ de 6 %. Le renforcement est maximal pour les systèmes à charges modifiées par les agents de couplage. La présence de la phase élastomère dans le mélange a pour effet de compenser en partie la perte de l'élasticité causée par l'ajout de $CaCO_3$ nanoscopique.

***Keywords**: Carbonate de calcium,Polychlorure de vinyle, Agents de couplage, Nanocomposites, Elastomères.*

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PA83

Experimental analysis of C–V characteristics in SiC Schottky diode

N. BENSEDDIK *[1], H. MAZARI [1], Z. BENAMARA[1], K. AMEUR[1], M. MOSTEFAOUI[1], R. KHELIFI[1],N.BENYAHYA[1] and J. M. BLUET[2].

1Laboratoire de Microélectronique Appliquée, Université Djillali Liabès, Sidi Bel Abbès 22000,Algeria

2Université de Lyon, INL Institut des Nanotechnologies de Lyon, CNRSUMR5270, INSA de Lyon F-69621 Villeurbanne Cedex, France

n_benseddik@yahoo.fr

A Ni/SiC Schottky diode was investigated both experimentally and theoretically by means of measured and simulated *C–V* characteristics. The measured *C–V* characteristics of the Schottky contact at two frequencies reveals a linear behavior at the 10 kHz curve and a distinct non-linear behaviour at the 300 kHz one. Extraction of the frequency independent capacitance by the Kevin method allows the

determination of the values of doping concentration and Schottky barrier height. The simulation code of the Schottky contact *C–V* characteristics is also developed. The effects of the film doping concentration and the trap states density are investigated.

PA84

Monte Carlo study of the compensation and magnetic behaviors of a mixed spin (3/2, 2) ferrimagnetic nanowire with core/shell morphology

N. ZAIM*, A. ZAIM AND M. KEROUAD

Laboratoire Physique des Matériaux et Modélisation des Systèmes (LP2MS), Unité Associée au
CNRST-URAC: 08, Faculty of Sciences, B.P. 11201 Zitoune,
Meknes, Morocco.

Zaim.noura@gmail.com

In this paper, the Mont Carlo simulation technique has been used to study the compensation and magnetic behaviors of a ferrimagnetic nanowire located on a simple cubic lattice. The nanowire is formed by a ferromagnetic core of spin -3/2 surrounded by a ferromagnetic shell of spin-2 with antiferromagnetic interface coupling. The effects of the shell coupling, the interface coupling and the crystal fields, on the magnetic properties are examined.

***Keywords*:** *magnetic properties; Nanowire; Monte Carlo simulation.*

PA85

Dielectric relaxation and ac conductivity in doped ZnO pellets

Mariem CHAARI* , Raoudha BEN BELGACEM, Adel MATOUSSI

[a]*Laboratory of Composite Ceramic and Polymer Materials (LaMaCoP),*
Sfax Faculty of Science , Soukra Road Km 4 Sfax 3038 Tunisia.

m_chaari@yahoo.fr

In this paper, we investigate the effect of Sn_2O_3 doping on structural, optical and dielectric properties of ZnO bulk ceramics synthesized at 900°C by the solid-state reaction technique. Added Sn_2O_3 composition in the range 0-15% was studied. X-ray diffraction patterns confirmed that all the doped ZnO pellets were polycrystalline with wurtzite hexagonal structure and having (101) as preferred plane of grain orientation. The optical band gap energy was significantly increased by addition of tin oxide. Dielectric properties and ac conductivity (σ_{ac}) were investigated by Impedance spectroscopy in the

frequency range 0.1–10^7 Hz and in the temperature range 250-450 K. An analysis of the complex permittivity and electric modulus as a function of frequency has shown non-Debye behaviour with strongly Maxwell-Wagner of dipolar relaxation. The temperature–dependent of ac conductivity of all ZnO pellets were revealed that correlated barrier hopping (CBH) model was the most suitable model of electric conduction. An analysis of the complex impedance by equivalent circuits indicates that the grain boundary contribution is dominating over the grain contribution in conduction process.

Keywords: ZnO, Microstructure, Dielectric properties, Electrical conductivity.

PA86

Synthèse et Caractérisation de la Céramiques à base de TiC-Al2O3 destinés à la Compaction à chaud

H . REZZAG[1], S. BOUDEBANE[1],S. GRAINI [1].

1 : laboratoire de métallurgie et génie des matériaux(L.M.G.M), Département de Métallurgie et Génie des Matériaux, Université Badji Mokhtar PB12, Annaba 23000 - ALGERIE

haddarezzaq@yahoo.com

La céramique TiC-Al_2O_3 est un matériau industriellement important .il trouve une large exploitation, comme pièces résistantes à l'usure, du fait de sa grande dureté et sa ténacité moins élevée, particulièrement comme outil de coupe.Notre étude a porté sur l'élaboration de la poudre céramiques noire par les procédés métallothermiques cette technologie permet de réduire sensiblement la durée du processus, et par conséquent le coût de production des matériaux suivis par un frittage sous charge. A cet effet, plusieurs mélanges de poudres ont été préparé par les techniques de la métallurgie des poudres (MDP).les essais métallothermiques ont réalisés dans le but mettre au jour l'influence de la nature de réducteur métallique (Al, Mg) et des ajouts sur le taux de réduction et sur la nature des phases formées. Les additions telles que Mg et SiO_2 et le bore introduit dans le mélange de base, ont pour conséquences les formations des nouvelles phases et des changements notables de la morphologie de la céramique et ces propriétés. Des observations par la microscopie à balayage MEB ont permis de mettre en évidence la morphologie de ces poudres élaborées ainsi L'analyse par diffraction des rayons X à confirme la présence des phases recherchées, en l'occurrence TiC -Al_2O_3 avec cependant de non réduits(TiO) et des résidus de graphite(c).

Mots Clés : *céramique, métallothemie, poudre, frittage.*

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PA87
Application of signal processing techniques to ultrasonic guided waves

BENAMMAR Abdessalem & Redouane DRAI
Division de Traitement du Signal et de l'image, Centre National de recherche scientifique et technique en soudage et contrôle. Route de Dély-brahim BP 64 CHERAGA – ALGERIE
Abs_benammar@yahoo.fr

Ultrasonic guided wave testing is an attractive alternative for large-area inspection since it offers the potential for rapid screening from a single transducer position and remote inspection of physically inaccessible areas of the structure. Compared to bulk waves, guided waves exist only in waveguides, such as plates and pipes, in which they continually interact with the boundaries of the material. Therefore they are confined and allowed to propagate over long distance. However, guided wave inspection is complex because there are many modes in plates and pipes and they are in general dispersive (their velocity is a function of frequency). In this work, the objective is to improve the time resolution and signal-to-noise ratio of signals obtained from inspection of plates by the A_0 and S_0 mode. The signal processing scheme used is based on deconvolution of the measured signal by matching pursuit signal decomposition. The deconvolution technique is applied to simulated signals from plates with various types of notch discontinuities. Using this technique, the separation distance between adjacent notches was estimated with high accuracy. A simulation study is conducted on the modes and their propagation generated due to the interaction mode and issued various defects existing in the material.

Keywords:*Ultrasonic, signal processing, Guided wave, Deconvolution*

PA88

Caractérisation de la transformation martensitique de l'alliage à mémoire de forme équiatomique Ti-Ni

Saida CHOUF, Hayet FARHI, Mostépha BENCHIHEUB, Soliman BELKAHLA

Laboratoire LEAM, Département de Physique, Faculté des Sciences, université Badji- Mokhtar, Annaba, B.P. 12, 23000, Annaba, Algérie.

soliman_belkahla@yahoo.com, benchiheubmoste@yahoo.fr , sa_chouf@yahoo.fr, ha_farhi@yahoo.fr

Les alliages à mémoire de forme sont des matériaux qui présentent la caractéristique remarquable de pouvoir changer de forme selon la température. Cette propriété désignée par l'effet mémoire de forme est liée à l'existence d'une transformation cristallographique de type réversible dite transformation martensitique thermoélastique.De tous les alliages à mémoire de forme (base Cu [1], base Fe [2]), les alliages base TiNi [3, 4] sont les plus communément utilisés à l'heure actuelle. Leur performance et leur biocompatibilité rendent possible des applications innovantes dans de nombreux domaines: biomédical, aéronautique, robotique, automobile, etc. …. Des mesures de calorimétrie, de frottement intérieur et de résistivité électrique à quatre pointes ont été effectuées afin d'étudier le comportement de la transformation martensitique dans un alliage à mémoire de forme TiNi équiatomique soumis à différents types de traitements thermomécaniques. L'analyse des résultats obtenus a permis de mettre en évidence l'influence du taux d'écrouissage et de la température de recuit sur le processus de la transformation martensitique. Dans un échantillon TiNi mis en solution, la transformation martensitique se manifeste en une seule étape (A → M). Tandis que, dans un échantillon écroui puis recuit à une température intermédiaire, on assiste à l'apparition d'une phase intermédiaire (R) au cours du refroidissement (A → R → M). Pour un échantillon brut d'écrouissage, la transformation martensitique est totalement bloquée, ceci est lié aux défauts introduits durant la déformation à froid. La transformation martensitique dans un alliage à mémoire de forme dépend fortement de son histoire thermomécanique.

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PA89

Study of physical properties of Ni doped CdS films deposited by a facile spray pyrolysis for solar cells

A. RMILI[1], F. OUACHTARI[1], A. BOUAOUD[1], A. LOUARDI[1], T. CHTOUKI[1], B. ELIDRISSI[1]and H. ERGUIG[1]

[1] Laboratoire des Hautes Energies, Sciences de l'Ingénierie et Réacteurs (LHESIR), Equipe Ingénierie et Matériaux (INMA), Département de Physique, Faculté des Sciences, Kénitra, Morocco.

[2] Ecole Nationale des Sciences Appliquées de Kénitra (ENSAK), Morocco.

rmili_ahmed@yahoo.fr

Undoped and Ni doped cadmium sulphide (Ni-CdS) thin films were prepared by a facile spray pyrolysis technique using perfume atomizer, from aqueous solution of hydrated cadmium chloride ($CdCl_2.H_2O$), hexahydrated nickel chloride ($NiCl_2.6H_2O$) and thiourea ($CS(NH_2)_2$as sources of cadmium, nickel, and sulphur ions respectively. The films were deposited onto the amorphous glass substrates kept at (400°C). The effect of the [Ni]/[Cd] ratio on the structural, morphological, optical and electrical properties of these films was investigated. X-ray diffraction (XRD) studies revealed that all the deposited films (undoped and Ni doped CdS) were polycrystalline with hexagonal structure and exhibited [101] preferential orientation.The scanning electron microscopy (SEM) images showed relatively a dense surface structure composed of crystallites in the spherical form whose their average size decreases when the [Ni]/[Cd] ratio increases. The optical study showed that all the films were highly transparent. The transmittance in the visible region varies between 70 and 85%, depending on the dopant

concentrations.The film obtained with [Ni]/[Cd] ratio = 0.04 showed minimum resistivity of $1{,}4.10^{6}\Omega$.cm at room temperature.

***Key words**: CdS thin films, Spray Pyrolysis, Ni doped CdS, Structural, Optical and Electrical Properties.*

PA90

New space charge dynamics in low density polyethylene underhigh dc electric fields

S. CHOUIKHI, E. BELGAROUI and A. KALLEL

Laboratoire des matériaux composites céramiques et polymères (LaMaCoP)

Faculté des sciences de Sfax BP 805 Sfax 3000 Tunisie.

slimchouikhi@yahoo.fr

For many years, experiments have suggested that there was an influence of space charge buildup under electric stress on the performances of insulators. Indeed, space charge packet accumulation in polymeric insulations, under high dc electric fields, is the origin of the breakdown phenomenon in these materials. However, the previous works show only the generation of charge packets in macro-scale polymers and the appearance of a one lobe for each polarity (positive or negative) in the same instant. In this paper, the occurrence of a new space charge packet aspect, in nano and macro-scales polyethylene sample, has been studied by using a transient bipolar charge transport model. Our numerical model results show that, in the same instant, the net charge density profile presents the appearance of two negative lobes. This new aspect modifies the local electric field distributions in the sample, and also results in the intensification and the oscillation of the transient conduction current density. Besides, the evolutions of the interfacial fields and the maximum field in the sample at different times are shown. Briefly, these results are obtained for the first time in modeling and they are very significant for nano and micro-technology for dielectrics.

***Keywords:** charge packets, submicron materials, polarity, two negative lobes, new aspect, bipolar model, interfacial fields.*

PA91
Transport properties of ion-atom collision

F. BOUCHELAGHEM[1] and M. BOULEDROUA[2]

[1]Physics Department, Badji Mokhtar University, B.P. 12, Annaba 23000, Algeria
Email: bouchefouzia@yahoo.fr
[2]Laboratoire de Physique des Rayonnements, Badji Mokhtar University, B.P. 12, Annaba 23000, Algeria
boumoncef@netscape.net

This work deals theoretically with the mobility of alkali ions (K^+) moving in a K atoms. Assuming a very low electric field, the calculations are performed quantum mechanically within the Chapman-Enskog approximation [1]. The calculations start by constructing the ion-atom potentials in the short-range, intermediate, and long-range regions. The appropriate dispersion coefficients are adopted. The potentials are further used to solve the radial wave equation and therefore to determine the phase shifts needed in the computation of the collision integrals and the coefficients of diffusion and mobility. The variation law with temperature of both coefficients is examined.

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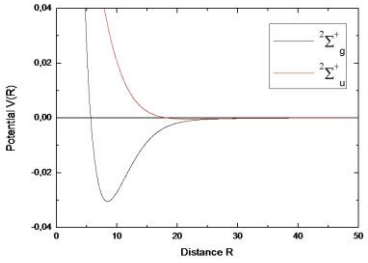
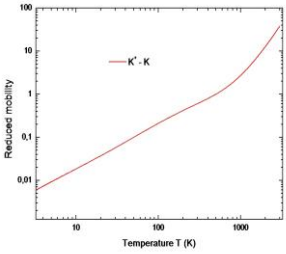


Potential energy curves of the K^+-K electronic states.



Reduced mobility is plotted as a function of temperature T(K).

PA92

Propriétés spectroscopie et optique du Rb (5s-5p) perturbé par les atomes de gaz rares.

F. BOUHADJAR[1], K. ALIOUA[2, 1], H. BOUTARFA[1]

1-Laboratoire de Physique des Rayonnement Université Badji Mokhtar, B. P. 12, Annaba 23000, Algérie.

2-Centre Universitaire de Souk-Ahras, Souk-Ahras 410000, Algérie.

Bouhadjar_fadila@yahoo.fr

L'élargissement de pression dans les ailes de la raie de résonance des métaux alcalins en présence des atomes de gaz perturbateurs qui les entourent, plus précisément la structure des satellites dans les ailes lointaines du rubidium perturbé par les atomes de gaz rares, a été l'objet de plusieurs travaux théoriques et mesures expérimentales. Par ailleurs les découvertes astrophysiques récentes des planètes géantes extrasolaires et des naines brunes ont incité la communauté scientifique d'élaborer des calculs puissants et des expériences de hautes qualités pour la détermination précise des paramètres physiques qui caractérisent ces astres. En effet les énormes progrès réalisés par les méthodes numériques, la disponibilité des potentiels et moments dipolaires de transition précis et le développement des techniques expérimentales ont permis de tels calculs et mesures. D'autre part le spectre de photo absorption produit par les atomes de rubidium immergé dans un bain d'hélium a été particulièrement examiné, théoriquement et expérimentalement, par plusieurs chercheurs. Nous présentons dans cet exposé la détermination purement quantique du spectre de photoabsorption et d'émission du rubidium Rb (5s→5p) perturbé par les atomes d'hélium He($1s^2$) dans leur état fondamental. Nous calculerons d'abord les courbes de potentiel et les moments dipolaires de transition (TDM) par une méthode ab initio SA-CASSCF-MRCI utilisant le code MOLPRO. Nous examinons ensuite l'exactitude de ces potentiels et (TDM) par le calcul de quelques paramètres spectroscopiques et la détermination des durées de vie des niveaux vibrationnels de l'état excité $A^2\Pi$. Enfin nous déterminerons la position des satellites dans les ailes lointaines du spectre d'absorption et d'émission, nous montrerons qu'elles sont en accord avec des résultats théoriques et expérimentaux.

Mots clés : *L'ELARGISSEMENT DE PRESSION, Rb, SATELLITE, SPECTRE D'ABSOPTION ET D'EMISSION.*

PA93

Pressure-Temperature Control System for Electrical Properties Measurements of Solids in Helium Gas Environment

M. ZDANOWSKA-FRĄCZEK, Z. J. FRĄCZEK

Institute of Molecular Physics, Polish Academy of Sciences, Smoluchowskiego 17, 60-179 Poznań, Poland

mzf@ifmpan.poznan.pl

The pressure-temperature control system consists of three parts: temperature control (based on Oxford temperature system), high pressure generating and control system and electrical measurements system. Data collections were made using an Agilent Vee Pro 7.0 program. High pressures are generated by means of the three stage IF-012 A Unipress helium gas compressor. Pressure was measured to an accuracy of 0.2 MPa by means of a manganine gauge (previously calibrated by reference to the pressure-induced phase transition of bismuth) with a Keithley 2400 Source Meter. The pressure chamber was made of heat-treated beryllium-copper alloy. The most difficult part of holding high-pressure helium gas is the electric plug. New structure of electric plug (especially suitable for low temperature measurements) based on corundum crystal was designed and used. The samples used for the dielectric or conductivity measurements were covered with golden electrodes and placed between two parallel golden plates. The samples of size of approximately 5x5x1 are sufficient for measurements. The pressure chamber was placed into Oxford flow cryostat. The temperature of the sample was set and stabilized using the Oxford Instruments automatic temperature controller ITC4. The temperature was measured with accuracy to 0.01 K by means of Pt100 sensor located inside the pressure chamber. Measurements can be performed on heating and cooling with different rate. For example, the heating /cooling rate in the vicinity of the phase transition was 0.02 K/min. Electrical properties of solids were measured using an impedance analyzer Hewlett-Packard HP 4284A or HP 4285A for the frequencies from 100 Hz to 1 MHz and from 75 kHz to 30 MHz respectively.The system is especially suitable for low

temperature measurements of electric permittivity, dielectric relaxation and phase transitions in ferroelectrics under different isobaric conditions. Recently, the system has been utilized for the measurements of the solid acids electric conductivity as a function of temperature, pressure and time by means of impedance spectroscopy. Due to illustration of technical possibilities of the system selected data concerning properties of the ferroelectric $(C_3N_2H_5)_5$ Bi_2Cl_{11} crystal under high hydrostatic pressure are presented.

***Keywords**: high pressure, dielectric materials,, electrical properties,*
***Acknowledgements:** This work was supported by the funds for science in Poland as a research project N N202 368 139.*

PA94

Electrical characterization of Schottky diodes made from SiCwith different contact surfaces

H. MAZARI[1], M. MOSTEFAOUI[1], K. AMEUR[1], N. BENSEDDIK[1], Z. BENAMARA[1], R. KHELIFI[1], N. BENYAHYA[1], J. M. BLUET[2]

[1]Laboratoire de Microélectronique Appliquée, Département d'électronique, Université Djillali Liabès de Sidi Bel-Abbes, BP:89, 22000 Sidi Bel-Abbes, Algérie.
h_mazari2005@yahoo.fr

[2]Université de Lyon, Institut des Nanotechnologies de Lyon INL-UMR5270, CNRS, INSA de Lyon, Villeurbanne F-69621, France

We present in this article current-voltage I(V) and capacitance-voltage C(V) characteristics of Schottky diodes based on SiC. These diodes have different surfaces of Schottky contact. The effect of the surface on the behavior of the diode is studied. Different current transport mechanisms are revealed from measurements. In addition thermionic current, other currents are added such that the recombination current, tunneling and current leakage current[1]. Different parameters are extracted from I(V) and C(V) characteristics, such as ideality factor, barrier height, serial resistance, doping and the density of interface states.

***Keywords**: SiC, Schottky diode, contact surface.*

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PA95

Effet de l'angle incidence sur l'efficacité du blindage électromagnétique monocouche.

S. HEDDAR, M. HAMOUNI, S.KHALDI

Laboratoire de recherche sur les macromolécules (LRM) département de physique, faculté des sciences, université de Tlemcen (13000)-Algérie

soumia_p@yahoo.com

Le présent travail, est une contribution à l'étude de l'effet de l'angle incidence sur l'efficacité d'un blindage électromagnétique monocouche à base de polymère conducteur composite.A cet effet, nous fixons la fréquence de la source de rayonnement et l'épaisseur de l'écran de blindage et on fait varie l'angle incidence. Les différents résultats que nous avons obtenus montrent que l'efficacité de blindage électrique augmente avec l'augmentation de l'angle incidence θ, par contre l'efficacité de blindage magnétique diminue avec l'augmentation de θ.

Mots clés **:** *Polymères conducteurs composites, blindage électromagnétique, efficacité, angle incidence.*

PA96

Linear and non linear dielectric spectroscopy of polymerstabilized by a short helical pitch ferroelectric liquid crystal

J. HEMINE[1,2,3], A. EL KAAOUACHI[4], R. DOUALI[2,3], J.M. LEBLOND[2,3], C. LEGRAND[2,3],
Y. CHERFI[5], A. DAOUDI[2,6]

1Université Hassan II Mohammedia- Casablanca, LPMC-FSTM, Mohammedia, Maroc

[2]Université Lille Nord de France, F-59000 Lille, France

[3]Université du Littoral Côte d'Opale, UDSMM, F-62228 Calais, France

[4]Université Ibn Zohr, LPMC, Faculté des Sciences, BP 28/S 80000 Agadir, Maroc

[5]Université des Sciences et de la Technologie Houari Boumediene, Alger, Algérie

[6]Université du Littoral Côte d'Opale, UDSMM, F-59140 Dunkerque, France

jamal.hemine@yahoo.fr

Ferroelectric liquid crystals (FLCs) represent an exciting field of functional materials, providing a large range of applications in display devices. The polymer stabilized ferroelectric liquid crystals (PSFLCs) have been investigated [1, 2] in order to enhance and to improve their electro-optic and mechanical responses. The PSFLC materials were obtained by an Ultra Violet polymerization process of mesogenic

monomers initially dissolved in a ferroelectric liquid crystal [3] host. We present in this contribution linear and non linear dielectric measurements on PSFLC systems (figure 1) using a FLC material with a short helical pitch and a high spontaneous polarization. These studies were also completed by structural and ferroelectric characterizations. The complementarities between the linear and non linear dielectric measurements (figure 2) and their confrontation with theoretical model allowed the simultaneous determination of some physical parameters as the ferroelectric polarization; the elastic energy and the rotational viscosity. The effect of the polymer network density on these physical parameters is also studied and discussed.

Figure 1. *Optical micrographs of PSFLC samples obtained in the isotropic phase showing the anisotropic structure of the dispersed network with 2%, 4% and 8% polymer concentrations.*

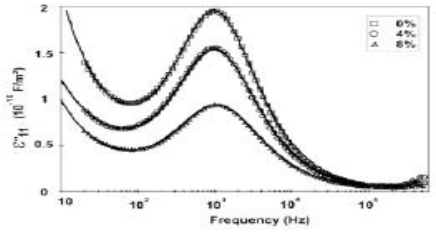

Figure 2. *Linear dielectric response showing imaginary part of the Goldstone relaxation mechanism obtained on the pure FLC compound and for PSFLCs with two polymer concentrations.*

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PA97
Optical technique to determine the stress stateIn a quenched Polymer

Khaled. AYADI
Applied Optics Laboratory
Institute of Optics , FERHAT Abbas University19000 SETIF - ALGERIA.
ayadi.khaled@hotmail.com

The exact knowledge of the stresses distribution permits to do some modifications on the piece shape in order to obtain the optimum mechanical stability; the knowledge of the distribution of stresses for any material with any loads permits to ovoid defects for different systems.This study can be done by adopting a simple supervising method. This observation can be done automatically using imaging means developed by the actual technology.Photoelasticimetry witch is an optical technique permit to know quickly the spatial stresses distribution and their values of a piece in order to perform its mechanical state. The photoelasticimetry is an experimental method to view the existing constraints and stress distribution inside a solid through its photo elasticity This method is mainly based on optical birefringence (decomposition of a ray in two rays when passing to certain types of materials) gained by materials subject to constraints. Birefringence of a material is only present on the application of stress and the magnitude of the refractive indices at each point is related to point stress state. It is used often in cases where mathematical methods and computer become too unmanageable to implement. In this work, we associate the numerical storage and processing equipment for dynamical image to photoelasticimetry for studying the effect of a thermal quenching at different temperatures of samples of polycarbonate.The walk difference of polarized lights following the two directions can be expressed by: $\delta = (n_1 - n_2)d = C(\sigma_1 - \sigma_2)d$

This equation is a fundamental in photoelasticimetry. For any wave length λ an expressing the walk difference in wave length number, this equation becomes: $\sigma_1 - \sigma_2 = \frac{\delta\lambda}{Cd}$

Knowing the dimensions of the samples are 40x40x2 mm^3, the photo elastic constant C is 60 Bw= $60x10^{-12}$ m^2/N The measurements were made in polychromatic light, followed by image processing two wavelengths 575 nm and 750 nm the stress results are then calculated

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PA98

Effet du dopage d'indium sur les couches minces d'oxyde deZnO

M. HAMICI
Laboratoire dosage analyse et caracterisation en haute résolution
Université Ferhat Abbas, Algérie
hemissi_melia@yahoo.fr

Le travail proposé traite l'élaboration des couches minces de ZnO pur et dopées à l'Indium, ces couches seront déposées sur des substrats en verre ordinaire ; on utilisant la méthode dip-coating. Les couches obtenues sont dopées à différents pourcentages d'Indium; pour étudier l'influence du dopage sur les propriétés structurales, optiques et électriques.L'analyse par DRX et par AFM, nous a permis de faire une caractérisation structurale et morphologique, en on étire la taille des grains, la rugosité de la surface des films ainsi que leurs profils. Le spectre d'absorption des couche dans le domaine UV-Vis nous a permis de voir le taux de transparence, de calculer la bande interdite, ainsi que d'autre paramètres optiques.Les propriétés électriques seront mesurées par la méthode des quatre pointes.

Mot clés : *ZnO, Indium, dip-coating, couches minces, transmission*

PA99

Méthode effective de résolution des Equations de Schrödinger non linéaires ayant des termes cubique-quintiques dans l'approche non paraxiale

J. ATANGANA [(1)], B. MOKHTARI [(2)], GOUADJIO D. Paul Yannick [(3)], N. CHERKAOUI EDDEQAQI [(2)] and T. C. KOFANE [(4)]

(1) Department of Physics, Higher Teacher's Training College of Yaoundé, University of Yaoundé I, Cameroon.

(2) Department of Physics, Faculty of Science, Moulay Ismail University, (Meknes), Morocco

(3) Laboratory of Electronics, Department of Physics, Faculty of Science, University of Dschang, Cameroon.

(4) Laboratory of Mechanics, Department of Physics, Faculty of Science, University of Yaoundé I, Cameroon.

atanganajaques@yahoo.fr

L'objectif de ce travail est de proposer une méthode de numérique permettant de décrire le comportement du champ exact, solution de l'équation de Schrödinger non linéaire (NLSE) au-delà de l'approche paraxiale. Nous obtenons la NLSE avec des termes cubique-quintiques. Nous définissons la méthode de Fourier à pas divisée appropriée puis, nous appliquons la méthode des variables collective afin de donner la description du champ exact et celle du champ reconstruit à partir des variables collectives lorsque nous sommes dans l'approche non paraxiale.

PA100

Some characteristic properties of theferrimagnetic nanoscaled thin film with spin-1/2

H. MAGOUSSI, A. ZAIM AND M. KEROUAD

Laboratoire Physique des Matériaux et Modélisation des Systèmes (LP2MS), Unité Associée au CNRST-URAC, Faculty of Sciences, B.P. 11201 Zitoune, Meknes, Morocco.

houda.magoussi@hotmail.com

The magnetic properties of a spin-1/2 Ising nanoscaled thin film with anti-ferromagnetic interfacial coupling, between the surface and the next layer are investigated. The influence of the parameters system on phase diagram, internal energy and on some other magnetic proprieties of the system are examined by using the two theoretical frameworks of the effective field theory, based on a probability distribution method, and the Monte Carlo simulation; We have found

that the nanoscaled system exhibit the compensation temperature, and triple hysteresis loops.

Keywords: *Ising model; Monte Carlo simulaion; Effective field theory; compensation temperature*

PA101

Influence de la position de la couche de polymère sur la réflectivité et l'efficacité d'un blindage électromagnétique tricouche dans la gamme de fréquence micro-ondes

A. ANSRI, M. HAMOUNI, S. KHALDI

Laboratoire de recherche sur les macromolécules (LRM) département de physique, faculté des sciences, université de Tlemcen, Tlemcen (13000)-Algérie

amel.ansri@yahoo.com

Dans ce travail, nous examinons l'effet de la position de la couche du polymère conducteur sur la réflectivité et l'efficacité d'un blindage électromagnétique tricouche. A cet effet, nous fixons les épaisseurs de différentes couches du blindage électromagnétique et faisons varier la fréquence de la source de rayonnement et la position de la couche du polymère conducteur. Les différents résultats que nous avons obtenus au cours de ce travail, montrent que l'efficacité et la réflectivité d'un blindage électromagnétique varient avec la variation de la fréquence de la source de rayonnement. Nos résultats montrent, aussi, une dépendance de la réflectivité et une indépendance de l'efficacité de la position de la couche de polymère

Mots clés : *polymère conducteur, couche absorbeur, blindage tricouche, réflectivité, efficacité, micro-onde.*

PA102

DETECTION OF SURFACE AND SUB SURFACE DEFECTS BY PHOTOTHERMAL DEFLECTION TECHNIQUE

A. DHOUIB , A. HAMDI , N. YACOUBI

University of Carthage, Photothermal Laboratory, IPEIN, 8000 Nabeul, Tunisia

dhouibamina82@yahoo.fr

Only few authors [1-2] have developed theoretical models for characterizing defects in materials by photothermal deflection technique. In this paper we propose a theoretical model where the sample is movable in the vertical plane x-y, thanks to two stepper

motors. The sample is heated perpendicularly by a uniform pump beam (one-dimensional treatment of the thermal wave). The theoretical amplitude and phase of the photothermal signal versus the displacement in the direction x are then compared to the experimental ones by considering two kind of defects. The first is a rectangular groove on the surface of a Plexiglas plate, the second is a subsurface defect in a aluminum plate. In The two cases dimensions and shape of defects are known so the good agreement between the experimental and theoretical curves proves the validity of our model.

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PA103

Exciton states and optical transitions in GaN/$Al_{0.3}$ Ga $_{0.7}$ N quantum well: Built-in electric field and dielectric mismatch effects

K. FELLAOUI, D. ABOUELAOUALIM, A. OUERIAGLI , A. OUTZOURHIT

LPSCM, Department of Physics, Faculty of Sciences Semlalia

Cadi Ayaad University P.O. Box 2390, 40000 Marrakech, Morocco

d.abouelaoualim@uca.ma

The binding energy of excitons in a strained wurtziteGaN/$Al_{0.3}Ga_{0.7}N$ quantum well in with the presence of dielectric mismatch[1] is discussed by making use of image potentials[2], and variational method. The calculation is performed for various parameters including the electron-hole mass ratio λ, dielectric constant ratio δ and well width LW. The electron and hole energy spectra are obtained by numerically solving the Schrödinger equation, for a single-band Hamiltonian. The built-in electric field in such a structure produced by spontaneous polarization and strain-induced piezoelectric polarization is considered in our calculation. For increasing built-in field, generated by the piezoelectric polarization and by the spontaneous polarization, the energy of size quantization rises and the number of size quantized electron and hole levels in a quantum well decreases. The exciton energy spectrum is obtained using electron and hole wave functions and two-dimensional Coulomb wave functions as a basis. We have calculated the exciton oscillator strengths and identified the exciton states active in optical

absorption. It is found that the image potential may play an important role in the formation of the excitons.

Keywords*: Strained wurtzite, Quantum well, Dielectric mismatch, Dielectric constant, Polarization.*

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PA104

Technique de mesure de la permittivité diélectrique complexe par cavité cylindrique Résonnante au Mode TM020

B. SAYAH[1,*], N. HAÏNE[1], M. MANSOUR[1], C. AIT KAIETZ[1]
[1]Laboratoire Physique des Matériaux, Faculté de Physique USTHB Alger, Algérie
[*]say_bi2008@yahoo.fr

Durant ces dernières années, les industriels ont continuellement eu besoin et produit des dispositifs d'électroniques intégrés aux grandes performances, mais de très petites tailles. Ces composants fonctionnent dans des plages de fréquences élevées que nous pouvons situer comme étant celle des hyperfréquences. Parmi les domaines industriels intéressés, nous pouvons citer les plus demandeurs qui sont ceux des secteurs de l'aéronautique, de l'aérospatiale, des télécommunications, la médecine, l'électrotechnique et bien d'autres portent un intérêt considérable aux matériaux. Les dispositifs électroniques contiennent entre autre des matériaux isolants appelés « diélectriques ». Ces diélectriques fournissent l'isolation des circuits en métal, le stockage d'énergie pour les condensateurs, etc. Le paramètre pertinent, qui caractérise le matériau diélectrique est la « permittivité relative du diélectrique ». Pour les diélectriques utilisés comme isolants, une permittivité relative faible suffit, alors que dans le cas où ils sont utilisés comme capacité, une permittivité relative forte est nécessaire [1] . Dans ce travail de recherche, on se propose de mesurer la permittivité diélectrique complexe de matériaux liquides en hyperfréquence. La cellule de mesure est une cavité cylindrique qui résonne dans le mode TM020. Les tubes capillaires remplis de liquides à étudier sont introduits à travers des trous d'insertions à l'intérieur de cette cavité. Le glissement des courbes de résonance et leurs atténuations dues à l'introduction des échantillons, permettent de calculer la variation de fréquences de résonnance et de coefficient de qualité. Les équations de dispersions de système, obtenus à partir des équations de Maxwell et les conditions aux limites reliées ces variations à la permittivité diélectrique de liquides [2]. La résolution de ces

équations à nécessiter l'élaboration de programme informatique.Les résultats obtenus ont été comparées à ceux trouvés dans la littérature.

Mots-clés :*Guide d'onde, hyperfréquence, cavité cylindrique résonnante, permittivité diélectrique complexe.*

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PA105

Modeling of the optical properties of ZnO/substrates in order to optimize the performance of a dye-sensitized solar cell.

N. BOUCHENAK KHELLADI and N.E. CHABANE SARI

University of Tlemcen, BP 119, 13000, Algeria.

bknesr18@yahoo.fr

Zinc oxide (ZnO) is one of transparent conducting oxide (TCO) materials whose thin films attract much interest because of typical properties such as high chemical and mechanical stability in hydrogen plasma, high optical transparency in the visible and near-infrared region [1,2,3]. Due to these properties ZnO is a promising material for electronic or optoelectronic applications such as solar cells (anti-reflecting coating and transparent conducting materials), gas sensors, liquid crystal displays, heat mirrors, surface acoustic wave devices [4,5,6]. In addition to the traditional applications ZnO thin films could also be used in integrated optics and gas sensors [7] and recently, in dye-sensitized solar cell (DSS). In fact, Zinc oxide represents a good compromise between cost and easy material to realize a DSS cell especially with sol gel deposition method [8]. The purpose of our work is to study the behavior of light transmission of ZnO deposited on SiO_2, SF14 and BK7 glass in order to optimize the performance of a dye-sensitized solar cell.The transmission spectrum is divided into two terms, non-interference term and interference effect term. A matlab source code was using to simulate Sellmeier equations in order to analyze variation of thickness of ZnO film and different parameters of the proposed model.

Keywords: *ZnO, Thin film, Sellmeier equation, optical properties, modeling.*

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PB1

Magnetoelectric phenomena in trilayered composites: experiments and modeling

[1]BELOUADAH Rabah, [2]GUYOMAR Daneil, [2] GUIFFARD Benoit, [3]BELDJOUDI Nadir

[1] Département de physique, Université de M'sila, PB 116 Ichebilia, M'sila, Algérie.
[2] Laboratoire de Génie Electrique et Ferroélectricité, INSA-Lyon, Bât. Gustave Ferrié, 8 rue de la Physique, 69621 Villeurbanne Cedex, France
[3] Laboratoire de physique théorique, USTHB Alger

r_belouadah74@yahoo.fr

This article reports on the magnetoelectric (ME) effect observed in trilayered polymers consisting of polyvinylidene fluoride (PVDF) and polyurethane (PU) filled with magnetically hard magnetite Fe_3O_4 or the dia-magnetic material (Bi_2O_3). The samples had the following compositions: (PU+2% wt Fe_3O_4 /PVDF/ PU+2% wt Fe_3O_4), (PU+10% wt Bi_2O_3 /PVDF/ PU+10% wt Bi_2O_3). In order to calculate and study the influence of the first and second-order ME coefficients on the dc magnetic field induced phase-switching phenomenon between dynamic ME current and applied ac magnetic field, this paper presents a model based on a driven damped oscillation system. The simulated results obtained with this model were compared to experimental data and a good agreement was found.

Key words: *magnetoelectric effect, polyvinylidene fluoride, multilayer, magnetic particles, composites.*

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PB2

Ageing effect on ferroelectric ceramics hysteresis

S. BOUMOUS[1], Z.BOUMOUS[1], S. BELKHIAT[2]
[1]*LEER Laboratory, Mohamed cherif Messaidia University Souk Ahras, 41000, Algeria*
[2]*DACHR Laboratory, Ferhat Abbas University , Setif, 19000, Algeria*
boumous@yahoo.fr

Two ferroelectric ceramic (PZT and $BaTiO_3$) are elaborated and studied in this paper. The study concerns the ageing effect on the $BaTiO_3$ hysteresis loops. The space charges, due to ageing under high electric field, have been characterized by asymmetric hysteresis loop. The hysteresis loops of the two ferroelectrics are drawn and discussed. The results show that the space charges accumulated displaces the hysteresis along the electric field axis and along the polarization axis and give an asymmetry in the remnant polarization and in the coercitive field.

***Key words**: space charge; $BaTiO_3$,PZT, hysteresis loop.*

PB3

Amélioration de la pureté des matériaux isolants en utilisant un séparateur électrostatique à deux étages

W. AKSA [1], M .REZOUG[1], K. MEDLES[1], M. MILOUDI[2], M . BILICI [2], L. DASCALESCU[2]
[1.]*Electrostatics and High Voltage Research Unit IRECOM, University Djillali Liabès Sidi Bel Abbès 22000, Algeria*
[2.]*Electrostatics of Dispersed Media Research Unit, Institut P', UPR 3346 CNRS-University of Poitiers-ENSMA, Angoulême 16021, France*
kmedles1972@yahoo.fr

L'objectif de ce travail a été de prouver l'efficacité d'une nouvelle installation de recyclage des matériaux plastiques granulaires provenant des déchets d'équipements électriques et électroniques. L'installation est composée de trois séparateurs électrostatiques indépendants, les produits d'un premier séparateur tribo-aéro-électrostatique étant ensuite traités dans deux séparateurs électrostatiques à chute libre. Les essais ont été réalisés sur un mélange de particules isolantes de (polychlorure de vinyle PVC) et de (polyéthylène PE). L'analyse de la pureté des produits obtenus s'effectue selon un nouveau programme de traitement d'image. Des puretés très élevées (99,37% pour le PE et 92,2% pour le PVC) ont été obtenues à un taux de récupération supérieur à 88%.

Keywords: *séparateur électrostatique, séparation tribo-aéro-électrostatique, recyclage, déchet d'équipements électriques et électronique, traitement d'images*

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PB4

Structural hardening mechanisms of lead-cadmium-aluminium alloys for battery's grids

Rachid KIDARI[1], Youssef AIT YASSINE[1], Elhassan ZANTALLA[1], Abdellah AGUIZIR[1],Jamaa ICHE[1], Saad ELMADANI[2,] Najim SELHAOUI[1], Lahcen. BOUIRDEN[1]

[(1)]Laboratoire de Thermodynamique et Energétique, Faculté des Sciences, BP 8106. Agadir, Maroc

[(2)]Laboratoire Physico-chimie des Procédés et des Matériaux, Université Hassan 1[er] FST Settat, Maroc

rachidkidari@hotmail.com

The reequilibration of supersaturated Pb-Cd-Al alloys was studied for the time range from one minute to over a year, by different experimental methods: hardness measurements; microhardness measurements; optical and electron microscopy. The content of Cd 2 weight %, the Al contents were 0,068-0,85 weight %. Two structural states were considered: as-cast alloys; rehomogenised alloy. The explored temperatures were 20 and 80°C. This last temperature corresponds to the curing temperature of battery's grids and to the highest operating temperature. Knowing that the ageing of lead-cadmium alloys is done in two concomitant phases; a discontinuous transformation and continuous precipitation. The overageing of the plomb-cadmium is characterized by a reaction of a discontinuous precipitation of the pure cadmium.

This study shows that in the presence of the minor additions of the aluminum, the mechanisms of structural hardening are identical to those of the alloys PbCd. However, we notice that the presence of this ternary element accelerates the kinetics of the hardening transformations.

Keywords: *Lead-acid battery. Alloys PbCd - PbCdAl, Structural hardening, Discontinuous/ Continuous Precipitation, Ageing and Overageing.*

PB5

Dielectric and structural properties of lithium ferrites

Sílvia Soreto TEIXEIRA[1],Manuel GRAÇA[1], Luís Cadillon COSTA[1]
[1]*I3N and Physics Department, University of Aveiro, 3810-193 Aveiro, Portugal*
kady@ua.pt

Lithium ferrite (LiFe5O8) has attracted special attention due to its numerous technological applications in microwave devices, magnetic recording, transformer cores, rod antennas and possible applications in biomedics. It is also a promising candidate for cathode materials in rechargeable lithium batteries, as well as low cost substitutes to garnet materials in microwave frequency applications. In the present work, amorphous Li2O-Fe2O3 powders were prepared via wet ball milling method. The as-prepared powders were heat-treated at temperatures between 400 and 1400 ºC and their structure analyzed by X-ray diffraction and Raman spectroscopy. Dielectric properties, in the frequency range between 100 Hz and 2 MHz, and temperatures between 200 and 360 K, were measured, and the results are correlated with the structural properties.

***Keywords**: Ferrite, dielectric response, impedance spectroscopy.*

PB6

Characterization of textural and structural properties of $(CeO_2)_x$-$(ZrO_2)_{1-x}$ mixed oxides.

Zohra SOLTANI, Madani GHELAMALLAH, Abderrahim BELLIFA, Fouzia BOUSEHABA, Koubra ARIBI
Laboratoire de Matériaux, Applications et Environnement, Faculté des Sciences et de la Technologie,
Université de Mascara, BP 305 Route de Mamounia, Mascara 29000, Algeria
gh_madani@hotmail.com

The effective means to use fossil fuels as a source of energy is to transform them catalytically into synthesis gas (H2 + CO). The use of ZrO2 shows more interest for the process of the dry reforming of methane because of its behaviour redox, acidity of surface, reducibility and high thermal stability. The basic oxide addition (e.g. CeO2) improves the catalytic performance and increase also the dispersion of metal, therefore to develop resistance to sintering by limiting the formation of carbon. A series of samples, noted ZrCeX (where X = % atomic of lanthana) have been prepared by hydrolysis, in neutral medium from ZrO2 and CeO2. These samples were calcined under

air at 450, 900 and 1200°C then characterized by specific surface area (BET), X-ray diffraction, thermogravimetry (TG), differential thermal analysis (DTA) and thermoreduction programmed under H2 (TRPH2). After hydrolysis ZrO2 and CeO2 are only partially hydrated. Obtained results show that after calcinations at:

- 450°C, a certain increase in specific surfaces area of ZrO2. CeO2 show a detriment effect on surface of zirconia. The results of DRX, TG-DTA and RTPH2 show that ZrCeX are formed principally by: ZrO2 and CeO2. It is noted that the global consumption of hydrogen increase with rate of CeO2 added.
- 900°C, the effect of sintering decreases slightly surfaces of oxides. Results of XRD and RTPH2 do not show any interaction between ZrO2 and CeO2.
- 1200°C, the resistance of ZrO2 to sintering increases with the rate of CeO2 added. It noted that ZrO2 incorporates CeO2, it is formed a standard pyrochlore phase of Ce2Zr2O7 and Ce2Zr2O7.04.

***Keywords**: ZrO_2, CeO_2, surface, structure, reactivity.*

PB7
Use of M/TiO_2 catalysts for cyclohexane oxidation in the liquid phase

A. BELLIFA, L. PIRAULT-ROY, C. KAPPENSTEIN and A. CHOUKCHOU-BRAHAM

Laboratory of Materials, Applications and Environment, University of Mascara, Algeria.

abellifa@yahoo.fr

Metals of transition are known for their properties redox and their capacity to catalyse the oxidation of the hydrocarbons [1,2]. In the last two decades, considerable applied as well as fundamental research efforts have been spent on the activation and the functionalization of hydrocarbons [3,4]. The oxidation of cyclohexane represents the typical example for this type of reaction which became the subject of several research these last years [5-7]. The cyclohexanol-cyclohexanone mixture called "olone" is the principal product of the reaction of oxidation of cyclohexane. The M/TiO_2 (M = Cr and V) catalyst were prepared by the sol–gel route and calcined at 400 °C. The experimental results of XRD analysis indicate that the materials present a crystalline structure with the presence of TiO_2 anatase varieties. BET analysis showed that the surface area varied with the

variation of metal content. TEM and EDX analysis showed a heterogeneous distribution of samples. Liquid phase oxidation of cyclohexane was carried out under milder reaction condition over M/TiO_2 catalysts using tert-butyl hydroperoxide (TBHP) as oxidant, acetic acid and acetone as solvents. The catalysts indicated low conversion and excellent products (cyclohexanol + cyclohexanone) selectivity.

Keywords: *mixed oxides, cyclohexane oxidation, sol-gel.*

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PB8
ELABORATION DE L'ALLIAGE Ti50Ni50 DESTINE AU DOMAINE BIOMEDICALE.

Kahloul LATIFA [1], **Chadli HACENE[2], Meddah SOUMAYA[3], Rezzag HADDA[4]**
Laboratoire de métallurgie et génie des matériaux (L.M.G.M)
Université d'Annaba, B.P12, 23000, ALGERIE.
l.kahloul@yahoo.fr

Le frittage en phase solide des mélanges (Ti-Ni) a été utilisé pour obtenir des pastilles d'un alliage Ti-Ni poreux. Cet alliage est utilisé dans le domaine de biomédicale (chirurgie orthopédique et dentaire, prothèses de hanche et de genou)

Les alliages de titane représentent des biomatériaux de choix en raison de leurs caractéristiques physiques et biologiques [1]. Par exemple, ils présentent une excellente résistance à la corrosion ainsi qu'un caractère biocompatible très prononcé [2].

Les résultas des investigations ont montré que notre matériau possède une certaine porosité ouverte qui assure l'adhérence des tissus avec le matériau. Pour confirmer cette adhérence nous avons fait une étude électrochimique dans une solution BPS (milieu physiologique) [3]. Les résultas de cette étude ont montré que notre alliage présente un caractère passive grâce à la

formation des oxydes TiO_2 et NiO_2 à la surface.L'analyse par spectroscopie d'impédance électrochimique montre que le comportement de notre alliage est purement capacitif Ceci explique le que le film passif formé à la surface conférant à l'alliage une grande résistance à la corrosion ainsi que cette couche d'oxyde est stable. Les résultats d'analyse par la diffraction des rayons x, la microscopie électronique à balayage et le profile de microdurté confirment la formation des intermétalliques.

Mots clés : *porosité, frittage, corrosion, alliage.*

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PB9

Study of the kinetics of the elimination Of hydrogen from copper alloys

D.E. HAMMOUDI

Department of Metallurgy and Materials Sciences, University of Annaba, 23000, Algeria

hamoudi566@hotmail.com

The good quality of the castings out of copper alloys is related particularly to the interest which it is necessary to carry on the elimination of the hydrogen which exerts a negative influence on the properties of liquid alloys. The speed of the absorption of nitrogen and its elimination of liquid alloy decreases appreciably in the presence of low contents of active substances. In our work studies on the influence of certain factors are presented on the kinetics of the elimination of hydrogen starting from copper and its alloys. For the study one chose pure copper, copper with the additions of phosphorus (0,01 and 0, 04%), of tin (10%) and nickel (10%), i.e. with components, having various surface activities.

Keywords*: Copper, absorption, kinetics, phosphorus.*

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PB10
The study of optical development of the natural ageing of the stabilized polyethylene used in greenhouses by the atr-ftir spectroscopy

M. HAMZAH[a], A. RJEB[a]*, S. SAYOURI[a] , D. SQALLI HOUSSAINI[a,b], M. DARHOURI [a]

[a] LPTA, Faculté des sciences Dhar El Mahraz, Université Sidi Med Ben Abdallah BP 1796 Fès Atlas, Maroc

[b] Département de Génie industriel, Faculté des Sciences et Techniques, Université Sidi Med Ben Abdallah BP2202 Fès, Maroc

arjeb@yahoo.com

This effects of natural ageing on "agrofilm" of stabilized polyethylene low density (LDPE) are studied in this work. The principal component of this ageing is the photo-oxidation. The elucidation of the modifications of the surface, and the changes wich take seat during four months of natural ageing were accomplished by the infrared ATR-FTIR spectroscopy. The important modification is resulting products of oxidation on the surface of the polyethylene stabilized with 4% of HALS.

Keywords: *Polyethylene LDPE; HALS, Natural weathering; Photo-oxidation, ATR-FTIR spectroscopy.*

PB11
Vibrations of carbon nanotubes and derivatives by spectral moment's method

S. AIT ABDELKADER, H. CHADLI, A. RAHMANI, FAKRACH AND M. BENTALEB

Laboratoire Physique des Matériaux et Modélisation des Systèmes (LP2MS), Unité Associée au

CNRST-URAC: 08, Faculty of Sciences, B.P. 11201 Zitoune, Meknes, Morocco.

majidaitabdelkader@gmail.com

The spectral moment's method was shown to be a powerful tool for determining vibrational spectra (infrared absorption, Raman scattering and inelastic neutron-scattering spectra) of harmonic systems. This method can be applied to very large systems, whatever the type of atomic forces, the spatial dimension, and structure of the material. In this work we will briefly review the concept of spectral moment's

method. Lattice dynamical models used in the calculations of phonon modes in carbon nanotube, this work became interested in vacancy defects in carbon nanotubes. Calculation of Raman spectrum of nanotubes with different types of vacancys (mono-, bi-, ... 6-vacancys) were calculated and the signatures n-vacancys have been identified. Then we will present some calculated results of vibrational spectra of carbon nanotubes with vacancies. Finally, the experimental Raman of carbon nanotubes with vacancys will be discussed in the light of lattice-dynamic calculation results.

***Keywords*:** *carbon nanotube, spectral moment, Raman and infrared.*

PB12

Microstructure properties of rapidly solidified Al_2O_3/Al composite Alloys

A. BOURBIA*, H. BEDBOUDI, S. BOULKHESSAIM, M. DRAISSIA

Laboratory of Magnetism and Spectroscopy of Solids (LM2S), Department of Physics, Faculty of Science, Badji-Mokhtar University, PB 12 Annaba, 23000 Algeria.

bourbiaamel@yahoo.fr

In this work, we study the microstructure and the microhardness Vickers of a set of composite Al-X wt.% Al_2O_3 (X = 2, 4, 16, 40) alloys with comparison to that of pure Al and Al_2O_3 materials. The pure materials and composite alloys were elaborated under vacuum by high fusion temperature (HF) process from compacted high-pure powders. The mechanical properties investigations were made by means of X-ray diffraction (XRD) analysis, optical micrograph observations and Vickers microhardness tests. The XRD spectrums made with Cu $\lambda_{k\alpha}$ = 0.154 nm radiation show that the microstructures of the as-alloys are a mixture of the CFC Al solid solution and the α-Al_2O_3 alumina which increases with alumina contents. We observe a grain size refinement in the alloys and a stabilized microhardness Vickers. This is essentially due to a strengthening of aluminium by alumina particles insertion in the HF melted alloys.

***Keywords**: Elaboration processes, Al alloys, Microstructure, Strengthening.*

PB13
Electrical and optical characterizations of $Zn_{x-1}Mg_xO$ Ceramic Composites
International Meeting On Dielectric Materials

Zayani Jaafar OTHMAN [1], Adel MATOUSSI [1]
[1]*Laboratory of Composite Ceramic and Polymer Materials, Scientific Faculty of Sfax, Tunisia.*
jaafar.zayani@yahoo.fr

In the present work, we investigate the optical and electrical properties of of $Zn_{x-1}Mg_xO$ composites prepared by the standard sintering method at 1200°C during 24 hours and doped with different weight percentages of MgO (x= 0-40%). Reflectance and absorption spectra were measured at room temperature by spectrophotometer in the wavelength range 200–2400 nm. Optical band gap (Eg), refractive index and dielectric constants were determined. Electrical properties of the ZnMgO ceramics were investigated by spectroscopic impedance at different temperatures (-100-100°C) and frequencies (0.1-10MHz). Results show a strong dependence of the permittivity constants with the structural qualities of the doped ZnO pellets and a decrease of dielectric loss with increasing the Mg proportion in ZnO matrix. The temperature dependent spectra of conductivity were analysed using the Jonsher's law to determine the activation energies. The curves of modulus showed Maxwell-Wagner relaxation at low frequency range and enhanced ionic polarization effects at high frequency.

Keywords: *$Zn_{x-1}Mg_xO$ Composites; optical properties; electrical properties; Dielectric spectroscopy.*

PB14
Etude première Principe de l'effet magnétique sur les propriétés structurales
et élastiques du nitrure de fer Fe_4N

H. MAIZ[1], A. GUEDDOUH[2], B. BENTRIA[2]
[1] *LPMF, Département de physique, Université des sciences et de la technologie d'Oran, Algeria*
[2]*Laboratoire des sciences fondamentales, Université de Laghouat, Algeria*
hamza_bac87@yahoo.fr

La recherche de nouveaux matériaux et composants pour le stockage magnétique des données est devenu un domaine scientifique très actif [1]. Dans les nitrures de métaux de transition, Le composé Fe_4N a été l'objet de plusieurs recherches à cause de ces propriétés magnétiques intéressantes. Ce présent travail a pour objectif de calcule ab-initio des propriétés structurales et élastiques avec et sans polarisation magnétique de Fe_4N. Les calculs sont conduits dans le cadre de la DFT avec la méthode des pseudos potentiels par les approximations LDA, LSDA qui sont intégrés dans le code de calcul (ABINIT pseudo potentiel Norme Concerving PP-NC) [2].

On a déduit que les propriétés structurales et les Constantes élastiques aussi que le module : de Young, cisaillement et de compressibilité et le coefficient de Poisson, varient constamment par l'effet de moment magnétique, et ce dernier a un bon accord avec les valeurs expérimentales et d'autres calculs.

Keywords: Nitrures de fer, proprieties élastiques, DFT

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PB15

ÉTUDE DES PARAMETRES ACOUSTIQUES DU BINAIRE Al-Si PAR METHODE NON DESTRUCTIVE

I. HADJOUB[1,2,A], H. BERBITI[2,B] L. ACHOU[2,C], Z. HADJOUB[2,D]

[1]Ecole Préparatoire aux Sciences et Techniques, EPST, Annaba, DZ-23000 Algérie
*e-mail : [a] **ihdjoub@yahoo.fr***

[2]Laboratoire des Semi-Conducteurs, Département de Physique, Faculté des Sciences,
*Université Badji-Mokhtar, BP 12, Annaba, DZ-23000, Algérie. E-mail : **lsc.contact@univ-annaba.org***

*[b] h_berbiti@yahoo.fr; [c] linda_achou@yahoo.fr; [d] **hadjoub.zahia@univ-annaba.org***

* Corresponding author: ***ihadjoub@yahoo.fr***

De nos jours, une attention particulière est accordée à la croissance des alliages basés sur le binaire, Al-Si en raison de son application potentielle dans l'industrie d'une façon générale et de ses intéressantes propriétés magnétiques et mécanique. Dans ce contexte, nous avons étudié les propriétés élastiques de l'alliage aluminium silicium, Al-Si[1]. Nous avons utilisé une technique d'évaluation non destructive pour déterminer les paramètres élastiques de ce matériau en utilisant les données du module de Young et de sa densité. Ainsi, il nous a été

possible de déterminer les vitesses : longitudinale et transversale à différentes proportions de Si, 10.8 at.%, 18.8 at.%, 23.6 at.%, 28.5 at.%, 33.3 at.%. De plus, nous avons étudié pour tous les cas considérés, les coefficients de réflexion et les signatures acoustiques respectives. A partir des résultats obtenus, nous avons déduit les relations des variations des angles critiques pour le mode longitudinal et celui de Rayleigh ainsi que la période spatiale et la vitesse de propagation du mode de Rayleigh, V_R, en fonction de la quantité du silicium. De plus, nous avons réussi à quantifier l'influence des proportions du Si sur l'évolution de la vitesse de Rayleigh, nous trouvé que V_R obéît à la relation suivante: V_R= 3035+ 12,7X.

Mots clés : *Al-Si, propriétés élastiques, signature acoustique, vitesse de Rayleigh.*

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PB16

Experimental Investigation Into Dielectric Properties Dependance of Paper Insulation

T. SEGHIER, F. BENABED, S. BOUDRAA, D. MAHI, B. ZEGNINI

Laboratoire d'étude et de développement des matériaux semi conducteurs et diélectriques

Université Amar Telidji de Laghouat Route de Guardaia BP 37G Laghouat Algérie

t.seghier@mail.lagh-univ.dz

It has been established that the service reliability of power transformers depends largely on the condition of the paper insulation. It is important to test the condition of the impregnated paper that is mainly used as primary transformer insulation. Dielectric spectroscopy in time or frequency domain offers new opportunities for an offline, insulation condition assessment of HV electric power equipment and its predictive maintenance nondestructively and reliably in the field. These techniques are global methods, i.e. each test object is regarded as a "black box" accessible only by its electric terminals. Therefore, only global changes of the insulation can be identified but not localized defects. Dielectric response in the

frequency domain (FDS) was developed from standard testing such as dielectric loss factor, capacitance and conductivity measurements at power frequency. The basic objective of the present study is to perform some dielectric tests with different paper insulation used in power transformer. Accelerated thermal and chemical aging procedures were performed in the laboratory. IDA 200 was used to evaluate frequency scan of insulation material properties in a large frequency range, starting from 0.1 mHz to 1 kHz. The frequency scans of the capacitance, dissipation factor, real and imaginary part of the permittivity, where measured as function of the insulation temperature.

***Keywords**: Paper insulation, Dielectric spectroscopy, Temperature, Dielectrics properties, Aging.*

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PB17

Matériaux hybrides et cellules photovoltaïques

F. ALLAMA [1],Y. NICOLAS [2], T. TOUPANCE [2]

[1] *Université Larbi Ben M'hidi , Oum Elbouaghi, 04000, ALGERIE*

[2]*Universsité de Bordeaux1, 351 Cours de la Libération Talence, 33405, France*

allamfouz@gmail.com

La conception des nouveaux chromophores organométallique présente un intérêt majeur pour la photosensibilisation d'oxydes semi conducteurs en vue de la réalisation de cellules photovoltaïques. Les cellules hybrides sont constituées principalement des matériaux hybrides peu onéreux (Oxyde métallique, colorant et électrolyte) et d'être facile à mettre en œuvre. Pour notre cas nous avons élaboré un matériau qui se forme d'un chromophore la triphenodioxazine caractérisée par des propriétés optiques, électriques et

électrochimiques très intéressantes. Après la caractérisation et les mesures physiques, optiques et électroniques qui ont assuré que ces matériaux peuvent être utilisés dans le domaine photovoltaïque, nous avons réalisé la cellule solaire hybride avec un rendement acceptable[1].

Mots clés: *Matériaux hybrides, cellules photovoltaïques, triphénodioxazine*

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PB18

Dielectric behaviour of uncrystallized water in hydrated proteins

A. PANAGOPOULOU[1], K. VARTZELLIS-NIKAKIS[1], A. KYRITSIS[1], P. PISSIS[1]

[1]*National Technical University of Athens, Zografou Campus, 15780, Greece*

panagann@central.ntua.gr

In this work we employ dielectric relaxation spectroscopy (DRS) and differential scanning calorimetry (DSC) in order to study the dynamics of uncrystallized hydration water in the case of hydrated proteins and, particularly, the globular protein bovine serum albumin (BSA) and the fibrous protein elastin. In addition, water equilibrium sorption-desorption (ESI) measurements are performed at room temperature. The hydration range is varied in small steps, in order to follow the evolution of the dynamics with hydration level. The water fraction values h_w (g of water per g of hydrated protein) are in the range of $0.01 \leq h_w \leq 0.3$. The relatively low levels of hydration facilitate the study of the dynamics of uncrystallized water because the contribution of ice is either absent or negligible in the particular hydration range, according to DSC measurements. In DRS we observe two relaxation modes which are common for the two hydrated systems studied. The first one is a secondary relaxation mode associated with water molecules attached on hydrophilic sorption sites, which is the main dielectric relaxation attributed to water of hydration (ν relaxation).[1] The ν relaxation is recorded already for almost dry samples. In particular, it has been shown that the associated water molecules trigger the motion of small polar groups on the protein surface and that the reorientation of water molecules alone is not the unique contribution to the dielectric

response at low levels of hydration.[1,2] The second one (*w* relaxation) is recorded at higher levels of hydration, obtains higher relaxation times and exhibits more complex dynamical characteristics, when compared to the *v* relaxation. In this work, the comparative study of those characteristics for the two protein-water systems suggests that the *w* relaxation originates from the motion of water molecules condensed within hydrophobic domains of the protein structure.

***Keywords**: Uncrystallized Water, Hydrated Biomolecules, Dielectric Spectroscopy, Plasticization*

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PB19

Electric and dynamical properties of the N,N-diethylethylendiammonium tetrachloroantimoniate (III) chloride, $[C_6H_{18}N_2]$ $SbCl_5$ crystals at high temperature phase

P. ŁAWNICZAK[1], K. HOŁDERNA-NATKANIEC[2], M. ZDANOWSKA-FRĄCZEK[1], S. CHAABOUNI[3]

[1]*Institute of Molecular Physics Polish Academy of Sciences, M. Smoluchowskiego 17, 60-179 Poznań, Poland*

[2]*Department of Physics, Adam Mickiewicz University, Umultowska 85, 61-614 Poznań, Poland*

[3] *Laboratory of Materials Science and Environment, University of Sfax, BP 1171, 3000 Sfax, Tunisia*

lawniczak@ifmpan.poznan.pl

The family of ionic complexes of general formula R_a M_b $X_{(3b+a)}$ contains metal-halide anions (based on Sn(II), Pb(II), Sb(III), Bi(III) and Te(IV)) and organic cations R. There has been much interest in these materials, due to their interesting electronic and electric properties (ferroelectricity, semiconductivity, luminescence and nonlinear optical properties)[1-3]. The investigations of the $[C_6H_{18}N_2]$ $SbCl_5$ crystal physical properties is a continuation of looking for new ferroic crystals within the halogenoantimonates(III) and bismuthates(III) containing large organic cations. The crystal structure is built of N,N-diethylethylendiammonium (NNDT) cations

separated by the layer of distorted $[SbCl_5]^{2-}$ square pyramids anions and isolated atom chlor. The N–H···Cl hydrogen bonds form a zigzag chains parallel to axis a. NNDT crystallize in the orthorhombic space group, Pnam, with lattice constant : a = 9.9700(0)Å, b = 10.8400(1)Å, c = 23.6360(6)Å and Z = 4 at room temperature. In this paper the electric conductivity measurements of the $[C_6H_{18}N_2]$ $SbCl_5$ crystal in high temperatures, above 270K up to melting point, were carried out by means of impedance spectroscopy. Independently, the dynamics of the $C_6H_{18}N_2$ cations as well as the proton motion have been studied by means of ^1H solid-state NMR. The results of both methods have been correlated.

The main results are listed as follows:

1. Conduction of the $[C_6H_{18}N_2]$ $SbCl_5$ crystal is a cooperative process (the Grottuss type diffusion mechanism of proton transport) involving both the $C_6H_{18}N_2$ cation reorientation prior to the proton exchange and migration along the hydrogen bonded chain.
2. A favoured type of conductivity in the compound studied is the protonic one.
3. The $C_6H_{18}N_2$ cations do not diffuse in the sample bulk even near the melting point temperature.Taking into account the inductive loop observed in impedance spectra, the dynamical process in $[C_6H_{18}N_2]$ $SbCl_5$ crystal above 393K can be assigned to the anion sublattice melting and the diffusion of $SbCl_5^+$ anions.

***Keywords**: impedance spectroscopy, electric conductivity, crystal structure, NMR*

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PB20
Analysis of breakdown voltage and on-resistance in power FLIMOSFET transistors

A. GALADI[1], F. MORANCHO[2, 3], M.M. HASSANI[4]

[1] Université Ibn Tofail, Faculté des sciences, Kenitra, Morocco
[2] CNRS, LAAS, 7 avenue du colonel Roche, F-31400 Toulouse, France
[3] Univ de Toulouse, Université Paul Sabatier, LAAS, F-31400 Toulouse, France
[4] Université Cadi Ayyad, Bd. Prince My Abdellah, Marrakech, Morocco
galadi-abdelghafour@univ-ibntofail.ac.ma

Power MOSFET device is a widely used power switch in low-voltage power conversion applications thanks to its high input impedance, very high switching frequency and thermal stability. In a power MOSFET structure, the most important design trade-off is that between the specific on-resistance (Ronsp), which is the product of the on-resistance and the active area of the device, and the breakdown voltage (Vbr) [1]. To reduce conduction losses in a power MOSFET, its specific on-resistance must be reduced. To obtain significantly Ronsp/Vbr improvement, some concepts were proposed like the trench power MOSFET [1], Superjunction MOSFET (SJ-MOSFET) [2] and FLIMOSFET [3]. In the trench power MOSFET, the gate electrode is buried in a trench etched in silicon. Consequently, high density trench-gated power MOSFETs with low on-resistance were proposed by the most of power devices manufacturers. The SJ-MOSFET replaces the conventional drift layer of a conventional power MOSFET by alternating p-type and n-type regions. Because the impurity concentrations of these regions can be increased, the Ronsp of power SJ-MOSFET was dramatically reduced. This paper presents an analysis of the FLIMOSFET concept in the case of lateral and vertical power MOSFET structure. In the FLIMOSFET, the improvement of the Ronsp/Vbr trade-off was obtained by inserting floating islands in the drift region of a conventional power MOSFET. Finally, results of numerical simulations will be presented and compared with analytic calculation results.

***Keywords**: Power MOSFET, Breakdown voltage, Specific on-resistance, FLIMOSFET concept.*

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PB21

Rôle de défauts ponctuels sur l'adsorption de l'oxygène atomique sur les surfaces (111) et (100) de nickel solide

CHERBAL NADJIA[1], MEGCHICHE EL HOCINE[1], AMAROUCHE MOHAND[1] ET C.MIJOULE[2]

[1]Laboratoire de Physique et Chimie Quantique (LPCQ), Université Mouloud Mammeri(UMMTO) Tizi-Ouzou,Algerie.

[2]Ecole Nationale Supérieure des Ingénieurs en Arts Chimiques et Technologiques CIRIMAT-ENSIACET, Toulouse.France

n_cherbal2000@yahoo.fr

La compréhension et le contrôle de la croissance des couches d'oxydes sur les matériaux solides est un enjeu fondamental dans la prévention de la détérioration prématuré des structures de large application industrielle. Dans le cas des alliages à base nickel, des résultats expérimentaux ont mis en exergue une probable assistance des lacunes présentes dans le métal dans l'accélération de l'oxydation (diffusion de l'oxygène plus aisé dans la matrice et formation accélérée de la couche d'oxyde NiO) [1]. Dans cette optique, nous avons effectué des calculs ab initio sur le système Ni-O. Pour modéliser les réactions au niveau de l'interface, nous avons étudié le processus d'adsorption de l'oxygène atomique sur les surfaces (111) et (100) de Nickel solide. Si de multiples équipes de recherche [2] ont étudié les processus d'adsorption de l'oxygène atomique sur les surfaces parfaites de nickel, le cas des surfaces réelles (en présence de défauts ponctuels) n'a, à notre connaissance pas été encore abordé. A cet effet, nous allons présenter les résultats de nos calculs concernant le système Ni-O menés dans le cadre de la théorie de la fonctionnelle de la densité et dans l'approximation non local GGA. Les enthalpies de formation des mono lacunes en fonction de la profondeur du plan ont été calculées pour les deux surfaces (111) et (100). Nous montrons que ces énergies croissent et atteignent une valeur limite correspondant à l'énergie de formation en volume [3]. Par ailleurs, pour le système Ni-O, nous constatons que l'introduction d'un défaut (mono lacune) au niveau des deux surfaces induit une augmentation de l'énergie d'adsorption de l'ordre 0.2 eV et donc une forte interaction du complexe lacune-oxygène sur le premier plan de la surface. Une amorce d'accélération de l'oxydation métallique pourrait donc être interprétée par la diffusion de ces types des complexes (lacunes-oxygène) dans le métal.

Mots- clés : *DFT-PAW, nickel, surface, lacune, adsorption.*

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PB22

Cubic-quintic Raman effects on optical fiber: Suppression of soliton self-frequency shift for high speed long distance transmission lines

J. ATANGANA [(1)] B. MOKHTARI [(2)] , B. G. ONANA ESSAMA[(3)], N. CHERKAOUI EDDEQAQI[(2)] , and T. C. KOFANE([(4)]

[(1)] Department of Physics, Higher Teacher's Training College of Yaoundé, University of Yaoundé I, Cameroon.
[(2)] Department of Physics, Faculty of Science, Moulay Ismail University, (Meknes) , Morocco
[(3)] Laboratory of Electronics, Department of Physics, Faculty of Science, University of Yaounde I, Cameroon.
[(4)] Laboratory of Mechanics, Department of Physics, Faculty of Science, University of Yaounde I, Cameroon.
atanganajaques@yahoo.fr

We propose a useful process to control a Raman soliton self-frequency shift (SSFS) in nonlinear optical fiber for a high-speed transmission system. We examine its controllability with a stimulated Raman scattering (SRS), described by the nonlinear Schrödinger equation (NLSE) with cubic-quintic high-order Raman. From some pulse parameters called collective variables (CVs), we present a theoretical investigation on this controllability and the harmful impact associated. We make known from CV analysis that this dangerous existence can be suppressed not only by upshifted filtering, but also by a combined effects of SRS and quintic term originating from SRS. Numerical analysis of CVs is studied.

PB23

Density functional theory investigation of electronic and band structure of $[W_6Cl_{18}]^n$ (n=0, -1,-2) in different spin states.

Nadia NEBBACHE[1], Youghourta BELHOCINE[2], Ahmed MEGHEZZI[1]

[1]*Laboratoire de chimie appliquée, Université de Biskra,B.P. 145, R.P., 07000, Biskra, Algérie*
[2]*Faculté des technologies, Université du 20 aout 1966, 21000, Skikda, Algérie*
nadia_nebbache@yahoo.fr

Molecular and periodic Density Functional Theory (DFT) calculations, in different states of spin configuration, have been carried out for $[W_6Cl_{18}]^n$ (n = 0,-1,-2) with respectively 18, 19 and 20 metallic electrons (ME) exceeding the optimal count of 16 ME in these species; in order to understand these "unexpected" electron counts and rationalize their physical properties. Geometry optimizations were carried out on isolated units showed that the octahedral metallic core is strongly distorted when the ME count exceed the favored electron count for such a chemical architecture. These distortions are nearby independent of the magnetic state of the units. Even if most stable isolated clusters are computed to be magnetic, energy differences are rather weak. Band structure calculations show that the electronic structure of bulk materials strongly derives from the MO diagram of the isolated W_6Cl_{18} unit.

***Keywords**: Cluster Compounds, DFT, Electronic Structure, Tungsten.*

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PB24
Influence des effets non linéaires sur la propagation des impulsions lumineuses dans les fibres optiques

Houria TRIKI, A. EL AKRMI

trikihouria@gmail.com

Laboratoire de Physique des Rayonnements, Département de Physique, Faculté des Sciences, Université Badji Mokhtar, P. O. Box 12, 2300, Annaba- Algérie

Les verres utilisés en général dans la fabrication des fibres optiques sont des matériaux amorphes (structures désordonnées) comportant donc de nombreux agrégats de matière incohérents. Au niveau macroscopique, ces éléments, lorsqu'ils sont illuminés, diffusent la lumière dans toutes les directions. Une partie de cette lumière est réinjectée dans le guide sous une forme différente de la lumière incidente et correspond à la conversion de modes. Une partie est réinjectée à nouveau dans le guide et correspond à une puissance

lumineuse rétrodiffusée. Une partie enfin ne peut être guidée et est éliminée dans la gaine. Si la première partie crée une perturbation de la capacité en transmission, les deux autres apparaissent comme des pertes et contribuent donc à l'atténuation. Selon la forme et la densité des agrégats vitreux, les lois de la diffusion peuvent varier. Dans les fibres courantes (silice dopée), la loi obtenue correspond à une diffusion uniforme (de Rayleigh). La réponse d'un milieu diélectrique à la lumière qui le traverse devient non linéaire pour des champs électromagnétiques intenses (champs laser avec E $>10^6$m/s). Cette réponse non- linéaire est due notamment aux mouvements non-harmoniques des électrons du matériau de transmission sous l'influence de l'onde qui le traverse. Les effets non linéaires sont parfois observables pour des puissances de l'onde dans la fibre relativement faibles qui sont de l'ordre de quelques dizaines de mW, ceci à cause des très petites dimensions des fibres (cœur) et des pertes très faibles. Dans ce travail, on s'intéresse à l'étude de l'influence des effets non linéaires d'ordre trois et d'ordres supérieurs sur la dynamique de propagation non linéaire des impulsions lumineuses dans les fibres optiques. La variation des propriétés optiques en fonction de l'intensité du signal utilisé est aussi étudiée dans le cadre de l'expression de la polarisation non linéaire.

Mots Clés: *silice, propriétés optiques, propagation des impulsions.*

PB25

Influence du traitement physique sur les caractéristiques de l'huile de transformateur

F.GUERBAS[1], K.BENDOUMA[1], N.MESSARAT[1], D.RAHAL[2], L.OUMERT[3]

[1] LSEI Laboratory, USTHB University BP 32 El Alia 16111, Bab Ezzouar, Alger, Algerie

[2]Chef service maintenance, SKMK, Spa, Sonelgaz, Blida, Algérie

[3]Chef division Unité Opérationnelle Traitement d'huile, SKMK, Spa, Sonelgaz,Blida,Algérie

f_querbas@yahoo.fr

Le traitement de l'huile diélectrique sur site est une opération qui rentre dans le cadre de l'entretien d'un transformateur. Les traitements peuvent être réalisés avec ou sans arrêt du transformateur et permettent de garantir un vieillissement contrôlé de ce dernier et

d'assurer un taux de service conforme aux attentes[1]. Cette opération consiste à filtrer, déshydrater et dégazer l'huile diélectrique du transformateur. Elle est assurée par des stations mobiles adéquates, ces équipements sont accompagnés par des appareils de mesure qui permettront l'analyse et le contrôle de certaines caractéristiques de l'huile au cours de traitement tels que la teneur en eau et la tension de claquage[2]. Notre travail porte sur l'étude de l'influence du traitement sur les caractéristiques de l'huile de transformateur. Ce traitement est effectué sur différents transformateurs appartenant à différents sites, il est suivi d'analyses physico-chimiques et électriques au laboratoire. Les résultats d'analyse de cette l'huile en service peuvent dès lors fournir des éléments pré-alertes concernant la dégradation de l'état de transformateur[3]. Pour éviter des problèmes sérieux, les analyses de différentes propriétés de l'huile peuvent être utilisées comme guide de mesures correctives à apporter aux transformateurs.

***Mots clés**: Huile de transformateur, traitement physique, propriétés physico-chimiques*

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PB26

Croissance des matériaux sous forme monocristalline pour des applications de scintillation

H. FARHI[1], S. CHOUF[1], S. BELKAHLA[1], K. LEBBOU[2]

[1] Laboratoire LEAM, Département de Physique, Faculté des Sciences, université Badji- Mokhtar, Annaba, B.P. 12, 23000, Annaba, Algérie.

[2] Institut Lumière Matière (ILM), UMR 5306 CNRS, Université Claude Bernard, Lyon 1, Domaine Scientifique de la Doua, Bât. A. Kastler, 10 rue Ada Byron, 69621 Villeurbanne Cedex, France.

ha_farhi@yahoo.fr

Depuis quelques années, le champ de la production de matériaux scintillateurs est devenu plus actif et plus attractif due à la forte

demande pour la fabrication de détecteurs performants destinés à des applications très diverses: aussi bien en physique (notamment dans le domaine de la physique des hautes énergies) mais également dans les domaines de l'imagerie médicale. Par ses remarquables propriétés de fluorescence, le composé Lu_2SiO_5 dopé cérium dite LSO:Ce[(1)] prend de plus en plus de place dans le monde des scintillateurs. Ses particularités telles que, (le grand pouvoir d'arrêt, l'intensité d'émission relative à 75% de NaI, le déclin rapide de l'ordre de 40ns sous excitation γ et de 30ns sous excitation UV, etc. …), lui donnent un avantage potentiel dans les différentes applications et spécialement dans les applications de TEP Scan. En effet, actuellement il est l'un des meilleurs matériaux connus pour l'application TEP Scan.
Dans ce travail, la croissance de LSO sous forme de fibre monocristalline sera étudiée. La technique de la croissance Laser Heated Pedestal Growth (LHPG) a été appliquée. Les fibres obtenues par cette technique étaient transparentes avec un diamètre stable et de bonne qualité cristalline. Les conditions de croissance et les résultats obtenus seront également discutés.

Mots clés : *fibres, LHPG, LSO*

Référence:

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PB27

Electrical properties and internal dynamics of bis(piperazine-1,4-diium) pentachloroantimonate (III) monohydrate

Krystyna HOLDERNA-NATKANIEC[1], Mohsen Ouled MOHAMED SGHAIER[2], Slaheddine CHAABOUNII[2], Aneta WOZNIAK-BRASZAK[1], Piotr CZARNECKI[1], Paweł ŁAWNICZAK[3], Maria ZDANOWSKA-FRACZEK[3]

[1] *Department of Physics Adam Mickiewicz University, 61-614 Poznan, Umultowska 85, Poland*

[2]*Laboratory of Materials Science and Environment, Faculty of Sfax, BP 1171, 3000 Sfax, Tunisia*

[3]*Institute of Molecular Physics Polish Academy of Sciences, 60-179Poznan, Smoluchowskiego 17, Poland*

natkanie@amu.edu.pl

Halogenoantimonates(III) and halogenobismuthates(III) with organic cations are interesting group of compounds due to their ferroelectric

properties. In these compounds the metal shows a tendency towards distorted octahedral coordination with some rather long Sb–Cl bonds, which is attributed to aspherical distribution of Sb(III) lone electron pair. The polarity of these crystals is associated with phase transitions, which are mainly caused by the changes in rotational motions of the organic cations. Bis(piperazine-1,4-diium) pentachloroantimonate(III) monohydrate crystallizes in the monoclinic system with space group P21/n (a = 9.5409(2)Å, b = 14.1455(1)Å, c = 10.0525(7)Å, β = 99.113(8)°, Z = 4).[1] The structure consists of piperazinediium cations, $[SbCl_5]^{2-}$ anions and a water molecules in which distorted $SbCl_5$ square pyramids sharing two commons Cl atom are held together a bioctahedra of form $[Sb_2Cl_{10}]^{4-}$ and was stabilized by intermolecular N—H….Cl, O—H….Cl and N—H….O hydrogen bonds. The dielectric properties were measured using a Hewlett-Packard 4192A impedance analyser at 50 kHz (E_{ac} = 1 V/cm) in the range from 30 K to 325 K. At T_c=70 K the electrical permittivity exhibit their maximum value. The Curie –Weiss dependence was analysed. The conductivity measurements were carried out in temperature range from 373 K to 448 K by means of impedance spectroscopy using a Novocontrol AlphaA Frequency Analyzer (0.1Hz, 10MHz). The impedance representations (Argand plots) has been used for the precise evaluation of their σ_{dc} conductivity. The temperature dependence of σ_{dc} obeys the Arrhenius formula which is characteristic for the thermally activated hopping process. Above 390 K the diffusion process of crystalline water influence on their electrical properties. In order to propose the model of internal dynamics of studied compounds, the ^1H NMR investigation were performed in temperatures 50 K-500K. The activation parameters of piperazine-1,4-diuum and crystalline water reorientations were obtained.

***Keywords**: molecular-ionic crystal 1, electrical permittivity 2, conductivity 3 , internal dynamics 4,*

References:

[1] M. *Ouled Mohamed Sghaier, S. Chaabounii, K. Holderna-Natkaniec send to Polyhedron.*

PB28

Synthèse est caractérisation de SnO2 dopé à l'indium

HAMICI .M S. LAGHRIB

Laboratoire dosage analyse et caracterisation en haute résolution
Université Ferhat Abbas Setif 1
Algeria
laghribs@yahoo.fr

Dans ce travail nous avons élaboré des films minces à 4 couches de SnO_2 pur et dopé à 40% d'Indium par voie sol gel. Ces films sont déposés sur des substrats en verre ordinaire par la méthode dip-coating et sont recuits à 500 ^{0}C, sous air. La caractérisation par DRX montre que la structure obtenue est tétragonale que ce soient pour les couches dopées ou non, avec une orientation préférentielle selon l'axe (110). Les image de l'AFM de ce composite montre une morphologie granuleuse et une rugosité des surfaces qui dépend du dopage. Le spectre de transmission des couches minces dans le domaine UV-Vis à montrer qu'ils sont transparents dans le visible, et qu'elles dépassent 75%, l'énergie de la bande interdite calculée à partir de ce spectre varie de 4.47eV à 4.56 eV.Le cycle photo-électrochimique nous a prouvé que les couches étudiées sont des semi-conducteurs de type n.

Mots clés : *films minces, dopé, Sol Gel, DRX, AFM, morphologie, rugosité, UV-Vis.*

PB29

Modeling and simulation of crack growth of stainless steel 304L

M. AZOUGGAGH[1], O.OUSSOUADDI[1] AND M. HATERBOUCH[2]

[1] Laboratoire Physique des Matériaux et Modélisation des Systèmes (LP2MS), Unité Associée au
CNRST-URAC: 08, Faculty of Sciences, B.P. 11201 Zitoune,
Meknes, Morocco.
azouggaghmed@gmail.com

In This work has an objective of aspect fatigue and more specifically the study of crack initiation and growth of austenitic stainless steel type AISI 304L. The calculation model in austenitic steels will be implemented in the code of finite element method ABAQUS / Standard using subroutine UMAT. The material behavior under cyclic loading is modeled using the model of Chaboche and Lemaitre. Taking into account the isotropic and nonlinear kinematic hardening is

necessary to describe the behavior of this type of material 304L. Simulation results on a test type CT-W50 (specimen compact tension with width W=50mm and thickness=1mm) will be exploited to found the influence of friction coefficient on the curve of rate crack growth.
***Keywords*:** *stainless steel 304L; Fatigue crack growth; Finite-element method.*

PB30
Regeneration De La Structure D'une Aube De Turbine En Superalliage Base Nickel

Saida BOUYEGH [1], Mohamed RETIMA [2], Leila DEKHIL [3].
Laboratoire de Métallurgie et Génie des Matériaux,
Laboratoire de mise en forme des matériaux métalliques.
Faculté des sciences de l'ingénieur
Université Badji Mokhtar Annaba, B.P12, 23000 (ALGERIE)
sbouyegh@yahoo.fr

En cours de fonctionnement à haute température les turbines à gaz subissent des variations de températures de plus en plus élevées. Elles ne peuvent supporter ces températures de fonctionnement tout en conservant leurs caractéristiques indemnes. Les aubes, sont parmi les pièces critiques des turbines à gaz qui sont soumises à la fois aux sollicitations thermomécaniques et corrosives les plus sévères. Ces sollicitations induisent différents types d'endommagement à savoir : le fluage, la fatigue, la corrosion et l'oxydation et parfois même de l'érosion qu'il importe de maîtriser afin de garantir la tenue en service. En fonctionnement, la microstructure évolue et on observe une mise en radeau des précipités. Cette évolution, qui est accompagnée d'une forte activité plastique, conduit à une détérioration importante des propriétés mécaniques, ce qui limite la durée d'utilisation des aubes. Les pièces en superalliage base nickel telles que des aubes de turbine terrestre arrivant en fin de potentiel de fonctionnement à cause d'un endommagement par fluage notamment. Pour des raisons économiques, il est nécessaire de développer des techniques de réparation afin d'allonger la durée de vie de ces pièces, le remplacement n'intervenant alors que pour les cas d'endommagement avancés ou après un certain nombre de réparations.La méthode de régénération de pièces consiste à un traitement thermique qui comporte en général une seule remise en solution dans la matrice

austénitique des différentes phases à une température comprise entre 1040-1230°C puis d'en contrôler la précipitation par pilotage de la vitesse de refroidissement afin de régénérer sa morphologie microstructurale, suivie de 2 revenus.Par effet d'homogénéisation, elle prépare la matrice à la précipitation uniforme de γ′ durant les traitements des revenus. Une série de revenus est ensuite entreprise, pour précipiter et développer les majeures phases de durcissement. Pour la résistance au fluage, la précipitation de γ′ se fait entre 840°C-1100°C. L'observation des microstructures en microscopie optique, microscopie électronique à balayage et en transmission a permis d'évaluer l'effet des différentes étapes du traitement thermique sur les caractéristiques microstructurales de l'alliage.Le but de la méthode est de leur faire récupérer leurs propriétés initiales afin d'en prolonger la durée de vie. À l'issue de l'ensemble des traitements thermiques, la majeure partie des phase ont précipités. Ce type de traitement donne des propriétés optimales de dureté mais entraîne une susceptibilité à la corrosion intergranulaire.

Mots clés : *Superalliages à base de Nickel, aubes de turbine, haute température, régénération, traitement thermique.*

PB31

Temperature effects on the behavior of insulating aterials submitted to the electron irradiation beam

B. ELSAFI[1], S. FAKHFAKH[1], O. JBARA[2],

[1]LaMaCoP, Faculté des Sciences de SFAX, Route Soukra Km. 3, BP 1171, C.P 3000 Sfax, Tunisia

[2]GRESPI/Matériaux Fonctionnels, UFR Sciences, BP 1039, 51687 Reims Cedex 2, France

bassem.elsafi@yahoo.fr

The temperature effects on the charging behaviour of insulating materials under electron beam irradiation has been investigated using electrostatic influence method (EIM) in a scanning electron microscope (SEM). A modified special arrangement adapted to the SEM allows to study charging mechanisms and charge transport characteristics of these materials using the simultaneous and individual measurement of displacement and leakage currents. The evolution of charge process during continuous electron irradiation can

be directly determined by the EIM. With increasing sample temperature, the experimental results show that the charging ability depends of material type. In this report, the secondary electron emission (SEE) yield is also determined. It was found the strong dependence of the SEE yield on the temperature variation. The higher is the temperature and the lower is the SEE yield. The trapping ability is analyzed taking into account the regulation mechanisms involved under electron irradiation.

***Keywords**: SEM, insulating materials, space charge, temperature*

PB32

Possible behaviors of TE modes in a left-handed waveguide by choosing different thicknesses of the nonlinear LHM layer

B . MOKHTARI[1,*], N. CHERKAOUI EDDEQAQI[2], J. ATANGANA[3]*, B. G. ONANA ESSAMA[3], T. C. KOFANE[3]

[1,2]Department of physics, Faculty of sciences, Moulay Ismail University, Meknes, Morocco

[3]Higher Teacher's Training College, University of Yaoundé I, Yaoundé: Republic of Cameroon

Nicet2012@hotmail.com

A theoretical studies of a slab waveguide made of left-handed material composed of nonlinear negative-index and surrounded by conventional (non NIM) linear materials has been analyzed. The dispersion properties of the guided waves have been examined, we discuss possible modes of the structure, and we show the nonlinear dispersion curves for several thicknesses and parameters of the nonlinear layer, the associated energy flow is also presented. It is shown that such structure can exhibit new types of modes and dispersion curves that do not exist in usual slab waveguide composed only of RHM.

***Keywords**: Slab waveguide, Left-handed material, Negative-index, Energy flow*

PB33
Etude des propriétés thermiques et physique d'un composite polyoxymethylene $CaCO_3$

Leila LATRECHE, N. HADDAOUI
Laboratoire de Physico-chimie des Hauts polymeres (LPC H P), UNIVERSITE FERHAT ABBAS SETIF ALGERIE
ableila2007@yahoo.fr

Les polymères sont susceptibles de remplacer avantageusement les matériaux de structure traditionnels. On peut distinguer entre autre leur légèreté, leur faible cout, les nombreux procédés disponibles qui permettent de les mettre en œuvre et de les mettre en forme simultanément. Dans le cas des polymères thermoplastiques nombreux sont leurs particularités qui les rendent intéressants.Notre objectif est l'incorporation d'une charge minérale le $CaCO_3$ dans du POM dans le contexte du développement d'un nouveau matériau composite, et de définir ses propriétés thermiques et physique. La majorité des études des thermoplastiques et de leurs composites s'attache à leurs seules propriétés mécaniques, leur comportement est plus complexe et constitue un obstacle majeur qui nécessite des études plus approfondies. Le polyoxyméthylène (ou polyformaldéhyde) est un polymère appelé également POM selon la norme ISO. Il existe soit sous forme copolymère (POMC), soit sous forme homopolymère (POMH). Les deux formes diffèrent peu. Le POM est un semi cristallin opaque et sa couleur naturelle est blanche mais il est souvent coloré. La forme homopolymère présente des caractéristiques mécaniques légèrement meilleures. Les carbonates de calcium sont des poudres blanches, non toxiques, inodores, insolubles dans l'eau pure, mais se dissolvent dans l'eau chargée de gaz CO2.Le carbonate de calcium représente la charge la plus employée dans le secteur des plastiques.Un traitement de surface du carbonate de calcium est effectué essentiellement pour réduire la tension superficielle et améliorer la dispersion de charge dans la matrice. Notre travail consiste à étudier les propriétés thermiques et physique du composite POM / $CaCO_3$

Mots clés : *propriétés thermiques, physique, Polyoxymethylene, $CaCO_3$*

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PB34

The hysteresis behavior and the dielectric properties of the ferroelectric bilayer system under the effect of a strain induced field

Y. BENHOURIA[1], I. ESSAOUDI[1,*], A. AINANE[1,2], M. SABER[1,2], R. AHUJA[3] AND F. DUJARDIN[4]

[1]*Laboratoire de Physique des Matériaux et Modélisation des Systèmes, (LP2MS), Unité Associée au CNRST-URAC 08, University of Moulay Ismail, Meknes, Morocco.*

[2]*Max-Planck-Institut für Physik Complexer Systeme, Nöthnitzer Str. 38 D-01187 Dresden, Germany.*

[3]*Condensed Matter Theory Group, Department of Physics and Astronomy, Uppsala University, 75120 Uppsala, Sweden.*

[4]*Laboratoire de Chimie et Physique des Milieux Complexes (LCPMC) Institut de Chimie, Physique et Matériaux (ICPM),1 Bd. Arago, 57070 Metz, France*

i_essaoudi@hotmail.com

The ferroelectric bilayer is composed by two different ferroelectric materials A and B. It has attracted much attention because of its physical properties which are different compared to its bulk counterparts. In particular, these properties are related to the thickness of each single slab, and the combination of the constituent materials. Moreover, it has a potential application in the microelectronics industry because of its enhanced dielectric permittivity, which is larger than the summation of the permittivities of its constituent materials. Superlattices of $BaTiO_3/SrTiO_3$ and $PbTiO_3/PbZrO_3$ have already been fabricated. The presence of strain in thin films can strongly influence the ferroelectric properties. For this reason we are interested to its study in this work. Our system can be handled by the Transverse Ising Model using the effective field theory with a probability distribution technique. The effect of the strain on the interfacial layers between two different slabs (A and B) can be described by an effective built-in field. The transition temperature, the susceptibility, the pyroelectric coefficient and the hysteresis behavior

of a bilayer system ($BaTiO_3/SrTiO_3$) are strongly influenced by strain and associated with slab thickness.

***Keywords*:** *Strain layers, Ferroelectric bilayer system, Susceptibility, Pyroelectric coefficient*

PB35

Critical properties of multi-surface ferroelectric thin films

Y. BENHOURIA[1,*], I. ESSAOUDI[1], A. AINANE[1,2], M. SABER[1,2], R. AHUJA[3] and F. DUJARDIN[4]

[1]*Laboratoire de Physique des Matériaux et Modélisation des Systèmes, (LP2MS), Unité Associée au CNRST-URAC 08, University of Moulay Ismail, Meknes, Morocco.*

[2]*Max-Planck-Institut für Physik Complexer Systeme, Nöthnitzer Str. 38 D-01187 Dresden, Germany.*

[3]*Condensed Matter Theory Group, Department of Physics and Astronomy, Uppsala University, 75120 Uppsala, Sweden.*

[4]*Laboratoire de Chimie et Physique des Milieux Complexes (LCPMC) Institut de Chimie, Physique et Matériaux (ICPM), 1 Bd. Arago, 57070 Metz, France*

ybenhouria@gmail.com

With the development of the artificial fabrication and its application to the growth of thin films, a renewed interest has been aroused in ferroelectric thin films both experimentally and theoretically, because of their significance in the fields of microelectronics and optoelectronics. The effects of the surface and size on the ferroelectric phase transition have been under investigation for a long time. But due to the variety of ferroelectric materials and the difficulty of preparing high-quality single-crystal samples, it is difficult to make useful general statements. The aim of this work is to study the dependence of the layer longitudinal and transverse polarizations, the dielectric susceptibility and pyroelectric coefficient of the multi-surface ferroelectric thin films, described by the transverse spin-1/2 Ising model, on different exchange interactions (surface, intra-layer and inter-layer) and surface and bulk transverse fields. We use the effective field theory with a probability distribution technique that accounts for the self spin correlations. This technique is believed to give more exact results than those of the standard mean field approximation.

***Keywords*:** *Ferroelectric thin film, Polarization; Phase transition; Transverse Ising model.*

PB36

Experimental Technique for Ameliorate The Properties of Transformer Oil BORAK 22 In Service

S. BOUDRAA[1], L. MOKHNACHE[2], B. SAIDAT[3], I. FOFANA[4], AND Y. HADJAJ[4]

[1] LeDMaScD, Laboratory for the Study and Development of Materials and Solid Dielectrics, University of Laghouat, Algeria

[2] University of Batna, Department of Electrical Engineering, Batna, Algeria

[3]Laboratory of Process Engineering, University of Laghouat, Algeria

[3]Canada Research Chair on Insulating Liquids and Mixed Dielectrics for Electrotechnology (ISOLIME), University of Quebec at Chicoutimi, Qc, Canada

saliha_boudraa2@yahoo.fr

It is well known that the presence of oxygen in the transformer oil accelerates the degradation of electrical, physical and chemical parameter, diminish service reliability, and shorten life expectancy. In this situation,, it is clear that the removal of dissolved oxygen from the oil of power transformers is highly desirable. The free oxygen increase the acid number wich is a forerunner of the formation decay product, this latter is considered as a most detrimental chemical process. More sensitive methods based on light absorption, can be used for detection of early stage dissolved decay product formation even at low acid number. Various techniques of removing oxygen from oil have been developed in the world. There is no doubt that premature deterioration of the insulation is largely prevented by limiting oxygen access to the oil. However, 90% of the world's transformers are freely breathing. Oxidation inhibitors are blended into the oil during manufacture or introduced during routine transformer servicing. This study specially effected on the mineral oil called Borak22 largely used by the Algerian Company of Electricity and Gas; show that the properties of Borak22 is strongly affected by thermal and electrical ageing which is accelerated by the oxygen presence. The investigation were therefore performed for the Borak22 submitted to different periods of accelerated thermal ageing, with and without Nitrogen injection, these same samples submitted an Electrical stress (arcing). The experimental tests and the measures of the dissolved gases, the dissolved decay product, the free radical and the acid number effected in ISOLIME laboratory, canada, in collaboration with the laboratory of Process Engineering of Laghouat university in Algéria evaluate the influence of the Nitrogen blanketing on

the proprieties degradation of the oil Borak22. The results of this application will be compared with those obtained by oil Nynas petro-lunx in ISOLIME laboratory, UQAC canada.

Key words: *Mineral oil, Nitrogen blanketing, , dissolved decay product, acid number.*

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PB37

Monte Carlo simulation study of the magnetic properties of a ferrimagnetic diluted Ising nanowire

H. MAGOUSSI*, A. ZAIM AND M. KEROUAD

Laboratoire Physique des Matériaux et Modélisation des Systèmes (LP2MS), Unité Associée au CNRST-URAC, Faculty of Sciences, B.P. 11201 Zitoune, Meknes, Morocco.

houda.magoussi@hotmail.com

Monte Carlo simulation has been used to study the magnetic properties, and the critical behavior of a diluted nanowire with cylindrical structure, consistting of a spin-1/2 ferromagnetic core which is surrounded by a spin-1/2 ferromagnetic surface shell with antiferromagnetic interface coupling. We have investigated the influence of the dilution on the magnetic behaviors of the system, the effects of the shell coupling and the interfacial coupling on both critical and compensation temperature are also examined.

Keywords: *Ising model; Monte Carlo simulaion; diluted nanowire; compensation temperature*

PB38
The role of hydrostatic pressure and temperature on polaron of shallow donor impurities in semiconductor quantum dots

A. EL MOUSSAOUY[A] AND N. OUCHANI[B]

[a] Centre Régional des Métiers d'Education et de Formation, Oujda, Maroc ; Laboratoire de Dynamique et d'Optique des Matériaux, Département de Physique, Faculté des Sciences,Université Mohamed I, Oujda, Maroc.

[b] Centre Régional des Métiers d'Education et de Formation, Fès, Maroc.

azize10@yahoo.fr

We studied theoretically the effects of hydrostatic pressure on the binding energy of shallow hydrogenic impurities in a cylindrical semiconductor quantum dot (QD) using a variational approach within the effective mass approximation. The hydrostatic stress was applied along the QD growth axis (z direction) and the interaction between the charge carriers (electron and ion) and confined longitudinal optical (LO) phonon modes was taken into consideration. We focus on the effect of the QD sizes, hydrostatic stress, and polaronic correction. The numerical computation for GaAs/Ga(1−x)Al(x)As semiconductor QD have shown that the ground state binding energy of shallow donor impurity with LO-phonon contribution is very significant with increasing stress. Both the binding energy and the polaronic correction increases linearly with increasing stress and present a qualitative agreement with those obtained in literature. Also, we investigated the effect of the temperature on the integrated photoluminescence (PL) intensity, and show that at relatively high temperature the LO phonons have a noticeable effect on it. This physical parameter also shows a great dependence on pressure.

***Key words*:** *Polaron, Pressure effects, temperature effects, quantum dot*

PB39

The important role of argon gas dillution on the amorphous to microcrystalline silicon transition.

K. KEFIF , Y. BOUIZEM, A. BELFEDAL, L. CHAHED, J.D. SIB, A. KEBAB

Laboratoire de Physique des Couches Minces et Matériaux pour l'Electronique, Université d'Oran, Es-Sénia, BP 1524, El M'naouar-31000 Oran, Algeria

kefifk@gmail.com

A study of the role of the argon gas dilution on the transition from amorphous to microcrystalline silicon at low growth temperatures (T_S=100°C) was performed, in order to use the new generation of substrates sensitive to elevated temperatures. The effect of the argon gas diluted in hydrogen, on the optical and on the structural properties was carefully investigated by means of optical transmission (OT) measurements, Fourier transform infrared spectroscopy and spectroscopic ellipsometry (SE) technique. The difference between the amorphous and the crystallized structures is well revealed by the OT and the IR absorption results, and strongly confirmed by the roSE ones. The pduction of Si crystallites in the plasma as means of producing nanocrystalline by RFMS is suggested.

Keywords: *Nanocrystalline silicon; ellipsometry; optical transmission.*

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PB 40

The Study of a rectangular elastic plate by Meshless Methods (MLPG, LRPIM)

Ahmed MOUSSAOUI and Touria BOUZIANE

Université Moulay Ismail- Faculté des Sciences de Meknès Laboratoire : Atomique, Mécanique, photonique et Energétique(LAMPE) B.P.11201 Meknes, Morocco

moussaoui.physique@gmail.com

We use a Meshless local petrov-galerkin method (MLPG) to analyse 2D-dimensional elastostatic deformation of a homogeneous rectangular plate. First the formulations of MLPG and LRPIM (Local Radial Point

d'interpolation) are obtained. We study the convergence and accuracy of MLPG and LRPIM in our case. Finally a comparative study of numerical obtained results is made.

Keywords: *MLPG; RBF; LRPIM; Meshless method; Linear Elasticity; plate.*

PB41

A birefringent switch from a 1D anisotropic photonic crystal

N.OUCHANI[1], A. EL MOUSSAOUY[2, 3]

[1]Centre Régional des Métiers de l'Education et de la Formation(CRMEF)- Fès
[2]Centre Régional des Métiers de l'Education et de la Formation(CRMEF)- Oujda.
[3]Laboratoire de Dynamique et d'Optique des Matériaux, Département de Physique, Faculté des Sciences, Université Mohamed I, Oujda, Maroc.

noama03@yahoo.fr

We demonstrate theoretically that a one-dimensional defective anisotropic photonic crystal can be used to switch a certain frequency light when appropriate geometry is selected. Our structure is formed by the combination of a simple finite superlattice, composed of two alternating birefringent biaxial layers, with a defect layer. The latter is made of the same material as one of the layers constituting the perfect superlattice, but with different orientation and thickness. We discuss whether the birefringence of the layers has a significant impact on the behavior of the structure. Green's function method is used to derive the necessary expressions for our calculation. The effect of different parameters, namely, the orientation of the layers, the filling fraction, etc, is investigated to achieve a birefringent switch.

Key words: *1D photonic crystal; Anisotropic periodic media; Coupled electromagnetic modes; …*

PB42

Polymérisation par ouverture de cycle de l'oxyde d'alpha pinène par Catalyse hétérogène

K. BEKHEMAS[1], A.HACHEMAOUI[2], A.YAHIAOUI[3]

Faculté de science et technologie.Laboratoire de chimie organique, macromoléculaire et des matériaux, bp 763 route de mamounia 29000 Mascara-Algérie.

yayachimie@yahoo.fr , hachemaoui2002@yahoo.fr, yahmeddz@yahoo.fr

Dans ce travail, nous avons étudié la polymérisation par ouverture de cycle de l'oxyde de l'alpha pinène mettant en jeu un catalyseur hétérogène naturel activé par l'acide sulfurique c'est le Mag-H^+qui est une montmorillonite algérienne traitée par l'acide, est un catalyseur

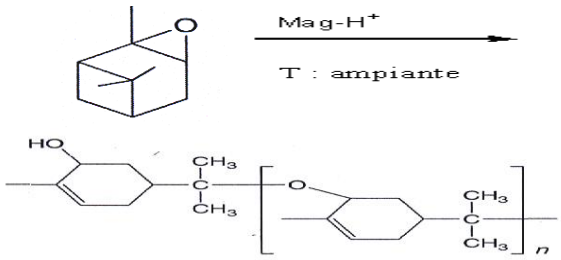
efficace pour la polymérisation cationique de nombreux monomères vinyliques et hétérocycliques [1,2]. Dans le but de trouver les conditions optimales de la réaction et d'améliorer la productivité de poly (oxyde de α-pinène) nous avons étudié l'influence de déférents paramètres sur le rendement. Les polymères obtenus ont été caractérisés par différentes méthodes d'analyses.

Les résultats obtenus montre que :

- Une augmentation de la température et de la quantité de la Maghnite-H favorise l'augmentation du rendement.

Les analyses faites sur le poly (oxyde de l'alpha pinène) ont confirmé la structure du polymère et nous ont permis de proposer un mécanisme pour la polymérisation de l'oxyde de l'alpha pinène catalysée par la Maghnite-H^+

La synthèse de Poly (oxyde de l'alpha pinène) montré dans le schéma suivant :



Le poly (oxyde alpha Pinène) est employé dans des applications de pharmaceutique et de cosmétique.

Mots clés : *Oxyde alpha pinène, catalyse hétérogène, poly (oxyde alpha pinène), terpènes*

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B43

Prédiction par modélisation de la variation stationnaire des contraintes, champ électrique, température et pression, dans un isolant PRC, contenant trois cavités.

M. HADJADJ[1], B. MOKHTARI[1] , M.DJILLALI[1] , M.FELIACHI[2]
[1]Université Ammar Thelidji, Laghouat, Algérie
[2] Institut Universitaire de Technologie de Saint-Nazaire
Hadj_merouane@yahoo.fr

Dans le présent article, nous nous proposons d'étudier l'influence de la présence des défauts et leurs positions sur la répartition du potentiel et sur les contraintes[1]: champ électrique, température et pression électromécanique, dans un isolant hétérogène d'un câble unipolaire de moyenne tension. Cette étude s'inscrit dans le cadre général de la fiabilité des isolants synthétiques[2]. L'outil de calcul retenu dans cette étude est la méthode des différences finies car elle est simple à adapter et permet en outre de comprendre les phénomènes pouvant avoir lieu à l'intérieur de l'isolant[1]. Les résultats obtenus et comparés avec succès à ceux publiés dans la littérature ont été jugés satisfaisants.

Mots clés: *Polymère, Cavités, Champ Electrique, Conduction thermique, Pression.*

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PB44

Contribution à l'étude de l'efficacité d'un blindage électromagnétique en champs proche et lointain : cas des polymères conducteurs composites

M. HAMOUNI, S. HEDDAR, A. ANSRI, S. KHALDI
Laboratoire de Recherche sur les Macromolécules (LRM)
Faculté des Sciences, Université Abou Baker Belkaïd
BP 119 (13000) Tlemcen – Algérie
m_hamouni@yahoo.fr

Le présent travail, constitue une contribution à l'étude théorique d'un blindage électromagnétique monocouche en champs proche et lointain en

fonction de la fréquence de la source de rayonnement. Nous faisons une étude comparative d'un blindage électromagnétique de deux écrans en champs proche et lointain. Ces écrans sont constitués des inclusions conductrices en trioxyde de vanadium (V_2O_3) lesquelles sont noyées respectivement dans une matrice en polyéthylène haute densité (HDPE) et en polyéthylène basse densité (LDPE). Cette étude a été réalisée sur une large gamme de fréquences (50 MHz – 50 GHz). À cet effet, la fraction volumique des inclusions conductrices est fixée. Cette fraction volumique, induise une conductivité électrique qui vérifier la condition de bon conducteur ($\sigma/\omega\varepsilon_0 >> 0$). L'épaisseur de l'enceinte blindée a été choisi supérieure à la profondeur de pénétration de l'onde électromagnétique; le matériau de blindage est électriquement épais.

Mots-cles: *polymères conducteurs composites, blindage électromagnétique, champ proche, champ lointain, atténuation due à la réflexion, atténuation due à l'absorption, efficacité globale.*

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PB45

Steady-state and transient electron transport within bulk, and : An updated semiclassicalthree-valley Monte Carlo simulation analysis

C. SAYAH[*], B. BOUAZZA[**], A. GUEN-BOUAZZA, N. E. CHABANE-SARI

Unité de recherche des matériaux et des énergies renouvelables, Faculté des sciences de l'ingénieur, Université Abou-Bekr Belkaïd de Tlemcen.BP 230, Tlemcen 13000, Algérie.

chou28dz@yahoo.fr,

An ensemble Monte Carlo simulation is used to compare high field electron transport in bulk InAs, InP and GaAs. In particular, velocity overshoot and electron transit times are examined. For all materials, we find that electron velocity overshoot only occurs when the electric field is increased to a value above a certain critical field, unique to each material. This critical field is strongly dependent on the material, about for InAs, for InP and /cm for the case of GaAs, We find that InAs exhibits the highest peak overshoot velocity and that this velocity overshoot lasts over the longest distances when compared with GaAs and InP. Finally, we estimate the minimum transit time across a InAs sample to be a bout . Similar calculations for InP and GaAs yield and , respectively. We find that the optimal cutoff frequency for an ideal InAs based device ranges from around when the device thickness is set to . We thus suggest that indium arsenide offers great promise for future high-speed device applications. The steady-state and transient velocity overshoot characteristics are in fair agreement with other recent calculations.

PB46

Effect of the thickness of CIGS absorber on the efficiency on thin-film photovoltaic cells based on $Cu(In,Ga)Se_2$.

S. MOSTEFA KARA[1], Z. ZIANI, A.BENMANSOUR, A. A. BOUSSETINE, N.E CHABANE SARI

[1]Materials and Renewable Energies Research Unit (U.R.M.E.R)
University Abou Bakr BELKAID
BP 119 Tlemcen, 13000 ALGERIA
mostefakaraselma@yahoo.fr

Photovoltaic solar is one of the best options for sustainable management of future energy needs of the world. PV thin film has been developed as a mean to significantly reduce the cost of solar cells. This has consequently led to the emergence of new technological processes, so-called "second and third generation", based on the use of thin films and nanomaterials. For this reason, the development of second generation solar cells based on thin film $Cu(In,Ga)Se_2$ seems promising. Indeed, the efficiency of these cells has exceeded the 20%[1] these last years. In the same aim of improving performance, our work consists to optimize the best efficiency for a typical structure of ZnO/CdS/CIGS. To this end, a two dimensional simulation is performed under environment Silvaco Atlas-2D to investigate the effect of

CIGS thin film on the performance of these devices with hetero-structures based on Cu(In,Ga)Se_2. We evaluate initially, the different electrical and optical characteristics (I_{CC}, V_{CO}, P_M, FF, η and efficiency quantum) for a typical structure of ZnO/CdS/CIGS. Subsequently we are interested on the thickness of the CIGS absorber layer to investigate the influence of this one on the electrical and the quantum efficiency of the structure. We obtain optimal efficiency of 17.57% and a form factor of 76.56% for a $1cm^2$ structure and thickness of the CIGS absorber layer of 4μm. This study has enabled us to optimize a better output of the ZnO/CdS/CIGS structure whence. We could show the impact of the layer of absorber CIGS on the level of the interfaces CdS/CIGS and CIGS/back contact. Therefore, we find that the parameters of the CIGS layer play a very important role in the improving of the efficiency of solar cells based on materials chalcopyrite Cu(In,Ga)Se_2 as it affects the electrical and optical properties of the structure.

Keywords: *Solar cell, thin films, Cu (In,Ga)Se_2 (CIGS), simulation, Silvaco.*

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PB47

Multiple scattering between suspended particles in presence of thermo-viscous effects

Youssef EL HASSOUANI[1], Abdellah BEANMI[2]

[1] Département de Physique FSTE, Université Moulay Ismail, Boutalamine B.P. 509, Errachidia, Morocco

[2] OTEA, Département de Physique FSTE, Université Moulay Ismail, Boutalamine B.P. 509, Errachidia, Morocco

hassouani@yahoo.fr

The aim of this work is to contribute to the understanding of the modeling of coherent wave propagation in fluids containing randomly distributed suspended particles (Figure below). Multiple scattering approaches are adapted to dilute media in the long wavelength limit. The range of validity of these descriptions can be extended by taking into account thermal and viscous effects. Assuming that these mechanisms are localized near the particle surfaces (i.e. thin boundary layers), we include them in the scattering of each pressure wave**,** while neglecting the thermo-viscous interaction between particles. Multiple scattering is assumed to occur for the pressure wave only. In this context, the formulae for the effective properties (wavenumber, mass density, stiffness) established in absence of thermal and

viscous waves (Foldy, Waterman and Truell, Lloyd and Berry) remain appropriate. It is therefore reasonable to use these formulae in conjunction with the scattering function of a single particle in the presence of thermo-viscous effects (Epstein and Carhart, Allegra and Hawley). The materials used are aqueous suspensions of 1-Bromohexadecane or silica spheres. The effects of heat transfer between the phases and of viscous friction are studied. When the contrast between the phase mass-densities is low, the thermo-elastic losses related to local cyclic heating and compression/expansion of particles dominate the visco-inertial losses associated with the resistance to the particle motion. The quasi-static expressions for the effective properties are established and then compared with the literature. Finally, the proposed approach, together with the matrix transfer method, is applied to the case of a screen containing a varying concentration of particles.

Keywords: *Multiple scatteting, acoustic wave*

PB48

Durabilité Chimique et Etude Structurale Des Bioverres à Base de Phosphate

Z. CHABBOU[1] , S. AQDIM[2]

Laboratoire des Hautes énergies et Informatique Scientifique, Département de Physique, Faculté des Sciences I, Université Hassan II Ain chock, Casablanca, Maroc

chabbou.zineb@hotmail.fr

Le but de ce travail est assujetti sur deux objectifs:

-1er objectif

- la Synthèse de nouveaux matériaux vitreux à base de phosphate susceptibles d'être utiliser dans différentes domaines technologique :
    - Domaine médicale (Biomatériaux)
    - Comme électrolytes solides
    - Méthodes alternative pour vitrification des déchets nucléaires

-2eme objectif

- faire une Approche structural de ses matériaux à base de phosphate et par suite avancer un model structurale.

Dans ce travail de recherche on a synthétisé une série de verres phosphatés avec des pourcentages différents d'oxydes, Les échantillons ont été analysés par plusieurs techniques :

- Analyse par Spectroscopie Infrarouge: Les spectres IR des verres étudiés ont été obtenus dans un domaine de fréquences comprises entre 599 et 1600 cm^{-1} à l'aide du spectromètre de transformée de Fourier. Les pastilles ont été préparées par un mélange d'environ 4 mg de poudre de verre avec 150 mg de KBr (bromure de potassium).
- Recuit des verres : des recuits successives par intervalle de 100°C on été effectués sur un ensemble de verres pour déterminer leur température de cristallisation
- Analyse par DRX: Les échantillons cristallisés entre 400 °C à 650 °C pendant 48h ont été analysés par la diffraction de rayon-X.
- Analyse par Meb : On a obtenu par le microscope électronique à balayage des images topographiques avec des hautes résolutions, ce qui nous a fournit en particulier des informations sur la taille des cristallites qui existent à l'intérieur des verres étudiés en plus la phase homogène vitreuse.
- Durabilité chimique : Les échantillons ont été immergés dans des béchers pyrex qui contiennent 100 ml d'eau distillée et portés à 90° C pendant 20j.

La spectroscopie I.R révèle un changement de structure qui résulte la formation des groupements de chaines metaphosphates avec des groupements de chaines pyrophosphates en faible concentration. Ce changement conduit a une durabilité chimique importante. Les diffractions des rayons X ont permet aussi de confirmer la présence des phases prédominantes types metaphosphates. Le MEB confirme l'existante de deux phases dont l'une est vraisemblablement cristallisée qui présente des cristallites de différents tailles de l'ordre de quelques microns. Le rapport de dissolution obtenu au niveau des verres est de l'ordre de 10^{-6}(g /cm^2/min). Ce résultat est encourageant et peut être encore amélioré pour conduire à des utilisations plus vastes de ces bioverres, particulièrement dans le domaine médical. Nos perspectives seront par conséquent, portées dans le sens d'améliorer les performances de ces verres pour une éventuelle application technologique.

PB49

Microstructural, Structural, Thermal and Magnetic Properties of nanocrystalline Co80Ni20 Alloy prepared by Mechanical Alloying

N. LOUDJANI [1,*], M. BOUOUDINA[2,3], A. M. AL. SAIE [2,3], N. BENSEBAA [1]

1 Laboratory of Magnetism and Spectroscopy of Solids LM2S, Department of Physics, Faculty of Science, University Badji Mokhtar of Annaba. Algéria.

2 Nanotechnology Centre, University of Bahrain, PO Box 32038, Kingdom of Bahrain

3 Department of Physics, College of Science, University of Bahrain, PO Box 32038, Kingdom of Bahrain

loudjani_nadia@yahoo.fr

Co80Ni20 mixture powder was mechanically alloyed by high energy planetary ball milling, starting from elemental Co and Ni metal powders. The morphological, microstructural, thermal and magnetic properties of the milled powders were characterized respectively by scanning electron microscopy, X-ray diffraction, differential scanning calorimetry and vibratory sample magnetometer. In addition to a highly disordered phase, two FCC solid solutions, FCC Co(Ni) and FCC Ni(Co), are observed after 3 h of milling. Their grain sizes decrease with increase in milling time attaining, at 24 h of milling, 10 nm and 20 nm, respectively. Beyond a certain milling time no further refinement of the microstructure occurs and the morphological equilibrium is usually given by a bimodal particle-size distribution. Magnetic measurements of the milled Co80Ni20 alloy powder exhibit a soft ferromagnetic character where the magnetic parameters are sensitive to the milling time mainly due to the particles size refinement as well as the formation of Co(Ni) and Ni(Co) solid solutions. Both the saturation magnetization (Ms) and coercivity (Hc) were found to decrease with milling time attaining the values of Ms = 126 emu/g and Hc = 60 Oe after 48 h of milling.

Keywords: *Nanocrystalline materials; Mechanical alloying; X-ray diffraction; Magnetization; Microstructure; Scanning electron microscopy.*

PB50

Study of annealing and edta induced changes in cds thin films deposited by chemical bath deposition method (cbd) using x-ray diffraction, meb and optical transmittance

F. OUACHTARI* [a], A. BOUAOUD [a], A. RMILI [a], A. LOUARDI [a], B. ELIDRISSI[a], H. ERGUIG [a]

a Physics Laboratory Matter and Radiation, Team Optical Spectroscopy of Solid Matter,
Physics Department, Faculty of Sciences, Kenitra, Morocco.
fouad489ou@gmail.com

Cadmium sulphide (CdS) thin films were deposited by chemical bath deposition method (CBD) on glass substrates. Anhydrous cadmium chloride (CdCl2) and thiourea (CS(NH2)2 were used as sources of cadmium and sulphur ions respectively. The influence of EDTA (comlexing agent) on the structural, morphological, chemical composition and optical properties of these films were investigated. XRD studies revealed that the film deposited without EDTA under conditions (Tb = 70°C, td = 60 min and pH = 10.8) are relatively amorphous. While the films deposited using EDTA as complexing agent were polycrystalline with hexagonal structure and exhibited (002) preferential orientation. These films showed large final thickness and their surface morphologies were composed of small grains with an approximate size of 12.52 to 30.60 nm and grains grouped together to form large clusters. The grain size increases when the EDTA concentration varying from 0.001M to 0.01M and decreases when the EDTA concentration is 0.012M. These films exhibited also a transmittance value more than 70 % in the visible and infra red range. Energy Dispersive X-ray Analysis (EDAX) revealed that this film was nonstochiometric with a slight sulphur deficiency. These films exhibited also an average transmittance value of about 80 % in the visible and infra red regions. The air-annealing improve our expectation: the change of structure from cubic (less stable structure) to hexagonal (more stable structure), decreased crystallite sizes and more ordered films as annealing temperature increases.

Key words: *cadmium sulphide, chemical bath deposition, air-annealing, sulphur deficiency, nonstochiometric.*

PB51
Analysis of the Influence of Insulation Monitoring Device Parameters on Insulation Electrical Network

HADDOUCHE Ali, HAMAIDI Brahim, Haddad Salim
University: Badji Moktar Annaba Algeria
Laboratoire : Génie Electromécanique
alihadouche@yahoo.fr

The outcome of a shock depends crucially on the value of current flowing through the human body. So the danger of electric shock can occur even in the presence of leakage currents. These currents that appear following the reduction or deterioration of insulation resistance of electrical networks can be dangerous. The role of insulation resistance is crucial in determining the conditions for safe operation of electrical installations in particular when a system with isolated neutral. In this paper we analyze the influence of permanent isolation controller on the parameters of the isolation of a distribution network to neutral IT. The degree of influence of Insulation Monitoring Device is determined with respect to the influence of internal parameters of the network such as the number of elements connected to the same power transformer (N) and length of distribution lines of electric power.

Keywords: *Neutral earthing, insulation resistance, conductance, reactance, impedance, leakage current, insulation Permanent Controller*

PB52
Ab-initio calculations of structural, electronic and thermal properties of CdS, CdSe and CdTe compounds

H. MERADJI[1], S. OUENDADJI[1], S. GHEMID[1], F. EL HAJ HASSAN[2]
[1]Laboratoire LPR, Département de Physique, Faculté des Sciences, Université de Annaba, Algeria
[2]Laboratoire de physique des matériaux, Faculté des Sciences, Université Libanaise, Elhadath, Beirut, Lebanon
Email: ***hmeradji@yahoo.fr***

A theoretical study of structural, electronic and thermal properties of CdS, CdSe and CdTe compounds is presented; using the full potential linearized augmented plane wave (FP-LAPW) method within density functional theory (DFT). In this approach, both the local density approximation (LDA) and the generalized gradient approximation

(GGA) were used for the exchange-correlation potential calculation. The ground state properties are determined for the bulk materials (CdS, CdSe and CdTe) in cubic phase. Quantities such as the lattice constants and bulk modulus of interest are calculated. Detailed comparisons are made with published experimental and theoretical data and show generally good agreement. The pressure dependence of band gaps for these systems was investigated. We also presented the thermal effects on some macroscopic properties of these compounds using the quasi-harmonic Debye model, in which the lattice vibrations are taken into account. We have obtained successfully the variations of the volume, thermal expansion coefficient, heat capacities and Debye temperature as a function of the pressure and temperature.

Keywords: *DFT, FP-LAPW, cadmium chalcogenides, thermal effects, structural properties*

PB53

Characterization of cobalt oxide of Co_3O_4 thin films prepared by spray pyrolysis method for electrochemical applications

A. LOUARDI, A. RMILI, T. CHTOUKI, F. OUACHTARI, A. BOUAOUD, B. ELIDRISSI *, H. ERGUIG[1].

Laboratoire des Hautes Energies, Sciences de l'Ingénierie et Réacteurs (LHESIR), Equipe Ingénierie et Matériaux (INMA), Département de Physique, Faculté des Sciences, Kénitra, Morocco.

[1] Ecole Nationale des Sciences Appliquées de Kénitra (ENSAK), Morocco.

louardiphysique@gmail.com

Cobalt oxide (Co_3O_4) thin films were prepared by a facile spray pyrolysis from aqueous solution of hydrated cobalt chloride salt ($CoCl_2$,$6H_2O$) as source of cobalt. The films were deposited onto the amorphous glass substrates kept at different temperatures (300 to 500°C). The influences of molar concentration of the starting solution and substrate temperature on the structural, morphological and optical properties of (Co_3O_4) thin films were studied. It was found from X-ray diffraction analysis (XRD) that the films prepared with molar concentration greater than 0.025 M/L were polycrystalline spinel type cubic structure. The preferred orientation of the crystallites of these films changes gradually from (622) to (111) when the substrate temperature increases. By Raman spectroscopy, five Raman active

modes characteristic of Co_3O_4 spinel type cubic structure were found and identified at 194, 484, 522, 620 and 691 cm-1. The Scanning Electron Microscopy (SEM) images showed micro porous structure with very fine grains less than 50 nm in diameter. These films exhibited also a transmittance value of about 70 % in the visible and infra red range. The electrochemical measurements of cobalt oxide Co_3O_4 thin films deposited on the conductive substrate (ITO) make Co_3O_4 thin films a promising material for using as electrochromic material in smart windows devices.

***Keywords**: Co_3O_4 thin films, Spray Pyrolysis, Morphology; Raman spectroscopy, Structural, Optical, Electrical, Electrochimical properties.*

PB54

Caractérisation de polymères soumis à une décharge couronne

E.BELHITECHE[1], M.A. HANDALA[1], N.KIRECHE[1], F.ZEBOUDJ[1], H.GOUDJIL[1]

[1]Laboratoire Haute Tension, Université Mouloud Mammeri de Tizi-Ouzou, 15000, Algérie

Email: h.belhiteche@yahoo.fr

Les polymères, grâce à leurs excellentes propriétés électriques, mécaniques et leur facilité de mise en œuvre, trouvent actuellement de nombreuses applications dans divers domaines (isolation électrique, aérospatiale, optique, métallurgie, biomédical, agroalimentaire, etc.). Cependant, les polymères présentent une résistance relativement faible aux décharges de surface comparés aux matériaux isolants tels que les céramiques ou le verre. Ainsi la fonctionnalisation de leur surface est plus facile en vue des applications industrielles, mais ils sont plus vulnérables quand ils sont utilisés dans les isolations électriques. Dans le présent travail, nous avons comparé le comportement de certains matériaux polymères tel que le PMMA, le SAN et la résine époxy vis-à-vis des décharges couronne. Les observations au MEB, les analyses FTIR et EDX, les mesures de l'angle de contact et des propriétés diélectriques ont montré l'influence du temps de vieillissement, du niveau et de la polarité de la tension de décharge appliquée sur les propriétés physicochimiques des matériaux étudiés. Lorsque la surface du matériau diélectrique est soumise à une décharge électrique, elle se dégrade, son hydrophobicité se réduit, sa

résistivité superficielle diminue avec le temps de vieillissement. La charge déposée à la surface, déstabilisée par le faisceau électronique du microscope électronique à balayage provoque le développement d'une arborescence en surface.

Mots clés : *Arborescences, décharge couronne, dégradation, hydrophobicité, vieillissement électrique.*

PB55

Simulation of IR spectra of nanotube from Morse potential

N.RIZQI, K. SBAI,

Laboratoire de Physique des Matériaux et Modélisation des Systèmes
Université MY Ismail, Faculté des Sciences, BP 11201, Zitoune,
50000 Meknes, Morocco

naimarizqi@gmail.com

Nanotechnology took off with the research initiated by nanotubes.Carbon. As its name suggests, a carbon nanotube1, is formed element known for the diversity of its allotropic forms, and the variety of chemical bonds that can be created with its neighbors. The nanotubes are one-dimensional nanoscale objects with properties, Physical original make extraordinary objects of study.The objective of our work is to simulate the structure and spectral responses of carbon nanotubes. Numerical methods are used to study the vibrational properties of these nanomaterials[1]. Among its methods. (Molecular Dynamics Method classical and ab initio spectral moment method). The tests so far achieved on samples of carbon (10, 10) by the program show the Raman spectra very different from those obtained from force constants of Saito. The evolution of lines obtained in the parameters of potential does not reproduce the observed spectrum clearly by other methods. Currently, our goal for the adjustment of the parameters involved in the Morse potential 2, can reproduce identically the spectrum of these nanoparticles.

Keywords*: pristine and defective carbon nanotube; interatomic interactions, mechanical properties, Morse potential.*

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PB56

Piezoelectric potential effects on electronic properties in ZnO/CdS core shell quantum dots

A. FENICHE, D. ABOUELAOUALIM, A. OUERIAGLI , A. OUTZOURHIT
LPSCM, Department of Physics, Faculty of Sciences Semlalia
Cadi Ayaad University P.O. Box 2390, 40000 Marrakech, Morocco
d.abouelaoualim@uca.ma

Piezœlectric potential[1] effects on optical properties in ZnO/CdS core/shell quantum dots[2] (QDs) were investigated theoretically using an eight-band strain-dependent k•p Hamiltonian. The strain effect on the shift of the subband energies is found to be larger than the piezoelectric field effect. Absolute value of the hydrostatic strain in the core/shell QDs increases with decreasing core/shell QDs size, whereas that in the barrier decreases with decreasing core/shell QDs size

Keywords*: Piezœlectric potential , core/shell , quantum dots, strain effect.*

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PB57

Elastic and thermodynamics properties of the B2- ErX (X=Cu, Au, Ag, Ir) type rare earth intermetallic compounds from ab-initio calculations.

A. SEKKAL[a,*] A. BENZAIR[b], T. OUAHRANI[a], H.I. FARAOUN[a], G. MERAD[a], H. AOURAG[a]
a Laboratoire d'Etude et Prédiction de Matériaux, Unité de Recherche Matériaux et Energies Renouvelables,
Département de Physique, faculté des Sciences, Université Abou Bekr Belkaid B.P 119, 13000 Tlemcen, Algérie.
b Département de Physique, faculté des sciences, Université Djillali Liabes. 22000 Sidi Bel Abbés, Algeria.
c Laboratoire de physique théorique Ecole préparatoire sciences et techniques B.P 230, 13000 Tlemcen,
Algérie.
asamad2002@yahoo.fr

The full-potential linearized augmented plane wave (FLAPW) method were employed within the generalized gradient approximation (GGA) to investigate structural and elastic properties of ErX (X= Cu, Au, Ag, Ir) compounds. The ductility or brittleness of these intermetallic

compounds is predicted, through this investigation reveals that the ErAg crystal is more ductile. Moreover, the elastic constants values and the sound velocities were discussed for longitudinal and shear waves. In addition, the chemical bonding of these compounds has been investigated in light of topological analyses approach grounded in the theory of atoms in molecules (AIM). All of the electron density critical points in the unit cell were systematically calculated in order to predict basins interaction of each atom.

Keywords: *Rare-earth intermetallic compounds, elastic properties, ab initio method, atoms in molecule formalism*
PACS numbers: 71.15.Mb, 71.15.-m., 62.20.de, 31.15.ae

PB58
Effect of quantum and dielectric confinement on biexciton state in PbSe-CdSe core/shell quantum dots

D. ABOUELAOUALIM
Department of Physics, Faculty of Sciences Semlalia
Cadi Ayaad University P.O. Box 2390, 40000 Marrakech, Morocco
LPSCM,

d.abouelaoualim@uca.ma

Quantum dots (QDs) have promising optoelectronic properties. Colloidal QD heterostructures, systems in which two semiconductors are incorporated in a single colloid, may show novel and potentially useful transport phenomena. Here, We study theoretically two electron-hole pair states (biexcitons) in PbSe-CdSe core/shell[1] hetero-nanocrystals, figure.1.To describe Coulomb interactions in these structures, we apply first-order perturbation theory, in which we use an explicit form of the Coulomb-coupling operator that takes into account interface-polarization effects[2]. This formalism is used to analyze the exciton-exciton interaction energy as a function of the core and shell sizes and their dielectric properties. Our analysis shows that the combined contributions from quantum and dielectric confinement can result in strong exciton-exciton repulsion with high interaction energies. Potential applications of strongly interacting biexciton states include such areas as lasing, nonlinear optics, and quantum information**.**

***Keywords**: Core-shell quantum dots, biexcitons, dielectric confinement, polarization.*

PB59

Charging effects of thermally aged XLPE under electron beam irradiation in a SEM

L. BOUKEZZI[1], S. RONDOT[2], O. JBARA[2], A. BOUBAKEUR[3]

[1] Materials Science and Informatics Laboratory, MSIL, University of Djelfa, BP 3117 route of Moudjbara, Djelfa 17000, Algeria.

[2] Laboratoire d'Ingénierie & Sciences des Matériaux, UFR Sciences, BP1039, 51687 Reims cedex 2, France.

[3] L.R.E. / Laboratory of High voltage, Polytechnic National School, BP182, EL-Harrach, Algiers, Algeria.

larbiboukezzi@gmail.com

The main goal of this study is to understand the trapping and transport of charges in thermally aged high voltage insulations. Specimens of cross-linked polyethylene (XLPE) aged at deferent temperatures ranged from 80°C to 140°C have been used and irradiated in scanning electron microscope (SEM). An arrangement adapted to the SEM for measuring the leakage and displacement currents have been used. The principal idea of the used technique based on electrostatic influence method (EIM). Measurements help in estimating the charge quantity and studying trapping processes during and after the electron irradiation. The effect of thermal aging on the dynamic trapping of XLPE and the time constants of charge processes were evaluated. Some correlations must be made between the obtained results of charging mechanisms and the electrical behavior of XLPE under thermal aging.

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PB60

Noise Spectral Density and Dynamic Behavior Of The Vortex In YBCO Thin Film

Abdelhalim HAFID[1] , Ahmed TAOUFIK[1] , Abella BOUAADDI[1] , Habiba EL HAMIDI[1] , Hassan ElouaDdi[1], Brahim LMOUDEN[1] , Mustapha BGHOUR[1] , Abdelaziz RAMZI[1] , Aziz LABRAG[1]

[1] *Laboratory of Materials Superconductors at High Critical Temperature, Ibn Zohr University, Agadir, Morocco.*

[2]Université Cadi Ayyad, Faculté Poly-disciplinaire, B. P. 4162, Route Sidi Bouzid 46000 Safi, Morocco.

asskti@hotmail.com

We have studied the voltage noise Vnoise and the voltage noise spectral density S_v of YBaCuO superconductor in the regime of high magnetic field. Our measurements were taken for different temperatures covering the vortex-glass and vortex-liquid transition which represents the Tg temperature glass, The voltage noise spectral density $S_v(f, T, H)$ as a function of frequency exhibits 1/f behaviour according to a lorentzian shape $A((1+ \pi f/f0)^B)^C$, where the constants A, f_0, B and C are all determined, and temperature has a strong influence. in addition, we study the variation in the velocity of the vortex as a function of temperature. The studied sample is a monocristalline YBaCuO thin film deposited by the ablation laser method on the surface (001) of a SrTiO3 substrate. In zero magnetic field, the resistance vanished a Tc= 90K. The C-axis of YBaCuO is perpendicular to surface of the film. Electrodes of measurement are in gold and deposited on the surface of the sample in situ by evaporation. The film has a thickness of 400 nm, and a width 7.53 µm. The distance between electrodes of power measurement is 135 µm. Contact resistances were less than 1 Ω [1]. Noise spectra were measured by a DC four-probe method. For experiences 1nA is used perpendicularly to the applied magnetic field direction. The noise amplitude is visualized on a programmable oscilloscope after it has

been amplified by a preamplifier of gain equal to 100 and filtered in a RC filter. The signal is finally recorded then analyzed by computer.

Keywords: flux flow noise, vortex dynamics, YBCO, Superconductors, Noise Spectral Density,

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PB61

Etude solvatochromique de la 3-benzylquinoxalin-2(1H)-one par spectroscopie UV-Visible

R. JDAA[1]*, B. BENALI[1], A. EL ASSYRY[1], A. BOUCETTA[1], B. LAKHRISSI[2]

(1) Laboratoire d'optoélectronique et de physicochimie des matériaux, Université Ibn Tofail, Département de Physique, BP 133, Kenitra, Maroc.

(2) Laboratoire d'Agroressources et Génie des Procédés, Université Ibn Tofail, Département chimie, BP 133, Kenitra, Maroc

jdaarachid@yahoo.fr

Notre travail s'intéresse à l'étude expérimentale et théorique des propriétés spectrales de la molécule d'intérêt biologique, cas de 3-benzylquinoxalin-2(1H)-one. L'étude expérimentale entreprise en absorption et en émission par spectroscopie UV-Visible sur la molécule à montré d'une part que les modifications spectrales sont dues essentiellement à des interactions spécifiques soit par liaison hydrogène, soit par transfert de charge. L'étude solvatochromique, nous à permis de constater que le 3-benzylquinoxalin-2(1H)-one admet deux bandes d'émissions de fluorescences (f_a et f_n) dans les solvants protiques et aprotiques (de grande polarité), et une seule bande (f_n) dans les solvants aprotiques moins polaire. La fluorescence anormale (f_a) observée dans les solvants très polaires est attribuée à une interaction intermoléculaire entre les solutés et les molécules des solvants dans l'état excité. Les résultats expérimentaux montrent une différence de moment dipolaire entre l'état fondamentale et les niveaux des états excités S_n et S_a, desquels la molécule émet la double fluorescence.

Mot clés : *3-benzylquinoxalin-2(1H)-one, Solvatochromique, Double fluorescence, UV-Visible, Absorption, Emission.*

PB62
Manipulating Surface-plasmon Polariton Interference on Metallo-dielectric Structure

M. BENDJEBBOUR, B. BOUHAFS, AND N. BORDJI
Université Aboubekr Belkaid- Tlemcen, Laboratoire de Physique Théorique BP 119, Tlemcen 13000 (ALGERIA)
Bendjebbour69@gmail.com

The conventional structure suggested by Kretschmann-Raether to generate surface plasmon modes (SPs) has been widely used to probe in real-time interface phenomena occurring on a conductor. When the conductor layer thickness, d_m is optimized in the order of the skin dept, = 50nm, in the visible spectrum, the rate of the energetic transfer of the electromagnetic field associated to surface modes propagating in the longitudinal direction to the conductor-analyte interface is limited in the time. In the order hand, the resonant character of the evanescent wave probed in the analyte region remains resolved around a unique dip measured on the reflected/transmitted intensity of an incident wave. In our contribution, we suggest a metallo-dielectric structure which has a similarity with Michelson-interferometer to manipulate surface modes. Through this manipulation, the sensitivity of the structure is crucial to keep the optical coupling between surface modes of interfaces 'structure where the width of an insulator material is increased more than the order of the skin dept. From a theoretical analysis, we investigate the confinement field through the heterogeneous structure Ti (d_{Ti})/ITO(d_{opt})/Ag. The confinement field is manipulated in tuning the widths d_{Ti} and d_{ITO}. The interfaces of the heterogeneous structure contribute to guide resonant surface modes which interfere constructively when the thicknesses d_{Ti} and d_{opt} are carefully initialized. The configuration under study is illuminated in p-polarized light of a fixed wavelength, in the visible range. The electric field intensity enhancement is considered as a key rule in enhancing the sensitivity of SPs. The obtained results are consistent and competitive to those recently found in the literature. Our theoretical study may help in the improvement and nanostructuration of a sensor based on surface-plasmon interference.

Keywords: *Surface -plasmon modes; Skin dept, Interface phenomena; Metallo-dielectric; Nanostructuration*

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PB63

Applications de la méthode des réseaux de neurones pour prédiction de la durée de vie en fatigue sous chargement aléatoire

M.CHAIB[1], M.BENLEBNA[1], A.SIDAHMED[1], A.AID[1], A.Z.A. ARAB

Laboratoire LPQ3M UNIVERSITE DE MASCARA

ALGÉRIE

m_chaib29@yahoo.fr

L'objectif de ce travail est la mise au point d'une démarche efficace pour prendre en charge les états de contraintes en fatigue uni axiale sous chargements réels afin d'évaluer l'état de l'endommagement et de prédire la durée de vie dans des structures. Dans ce travail, on discute l'application des méthodes non classiques, telles que les réseaux neurones artificiels, afin de prendre en charge la correction de la contrainte moyenne, les lois de cumul du dommage, les modèles de cumul sous chargement aléatoire. Pour la validation de la démarche proposée, les données expérimentales de la bibliographie sur la fatigue sous chargement aléatoire pour des matériaux métallique sont utilisées ainsi des essais supplémentaires seront réalisés.

Mots clés : *Fatigue, endommagement, réseaux de neurone, chargement aléatoire.*

PB64

Etude du comportement mécanique des matériaux polymères (Cas du PE100)

A.Z.A. ARAB[1], A. AID[1], M. CHAIB[1], A. BALTACH[1]

[1] *Laboratoire LPQ3M, Université de Mascara, 29000, ALGERIE,*

arabalizineelabidine@yahoo.fr

Les polymères sont des matériaux formés de longues molécules à liaisons covalentes englobant les matières plastiques et les

caoutchoucs. Au cours des dernières décennies, l'emploi des polymères à considérablement progresse, remplaçant souvent des matériaux traditionnels (métaux, bois) ou des textiles naturels (coton, laine, ect...).La rupture des polymères résulte du développement de craquelures précédant la formation et la propagation d'une fissure. Le but de ce travail est de déterminer l'énergie dissipée dans la zone plastique par la méthode EWF, en utilisant l'essai de traction puis une validation numérique par le code de calcul ABAQUS/CAE, Les résultats obtenus sont basé sur l'approche énergétique.

***Keywords**:* méthode EWF, PE100, énergie dissipée dans la zone plastique.

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PB65

Theoretical investigation of structural and electronic properties of CuCl, CuBr and CuI compounds under hydrostatic pressure

S. LOUHIBI-FASLA[A,b], H.REKAB DJABRI [a], H.ACHOUR [a,b]
[a]Laboratoire de Micro et de Nanophysique LaMiN - ENSET d'Oran
[b]Département de Physique-Chimie, Ecole Normale Supérieure de l'Enseignement Technique, BP 1523, El M'Naouer, 31000 Oran, ALGERIA
fasbenplast@yahoo.fr

We have applied a recent version of the full potential linear muffin-tin orbitals method (FPLMTO) to study the structural and electronic properties of copper halides CuX (X=Cl, Br, I) under high pressure using the local density approximation (LDA) and the generalized gradient approximation (GGA) for the exchange and correlation potential by Perdew et al. Results are given for lattice parameters, bulk modulus and its first derivatives in the wurtzite, zinc-blende, rock-salt, CsCl, NiAs, βSn, the Cinnabar and the hexagonal structures. The results of these calculations are compared with the available theoretical and experimental data.

Keywords: *CuX (X=Cl, Br, I); PLW-FPLMTO; structural properties; Pressure; Phase transition.*

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PB66

Elaboration et caractérisation des couches minces d'oxyde de cobalt zinc ($Zn_xCo_{3-x}O_4$) préparées par pulvérisation chimique réactive en phase liquide (SPRAY).

T. CHTOUKI, A. RMILI, A. LOUARDI, F. OUACHTARI, A. BOUAOUD, B. ELIDRISSI *, H. ERGUIG[1].

Laboratoire des Hautes Energies, Sciences de l'Ingénierie et Réacteurs (LHESIR), Equipe Ingénierie et Matériaux (INMA), Département de Physique, Faculté des Sciences, Kénitra, MOROCCO.

[1] Ecole Nationale des Sciences Appliquées de Kénitra (ENSAK), MAROC.

chtouki.tarek@yahoo.fr

Des couches minces d'oxyde de cobalt zinc ($Zn_xCo_{3-x}O_4$) ont été élaborées par pulvérisation chimique réactive en phase liquide utilisant un atomiseur de parfum. La solution de base employée est un mélange de chlorure de cobalt hexa hydraté ($CoCl_2$, $6H_2O$) et de chlorure de zinc ($ZnCl_2$) dissoute dans de l'eau distillée. La qualité cristalline des couches élaborées à différentes concentrations de zinc est examinée en utilisant différentes techniques d'analyses : analyse par diffraction des rayons X et spectroscopie Raman. L'analyse par diffraction des rayons X indique que les couches minces de $Zn_xCo_{3-x}O_4$ ($0 \leq x \leq 1$) sont polycristallines. L'indexation des raies de diffraction (111),(220), (311), (222),(400), (511), (440) et (622) confirme que la structure cubique est de type spinelle de l'oxyde de cobalt zinc. On observe aussi que pour des concentrations élevées du zinc ($0.8 \leq x \leq 1$) l'apparition de nouveaux pics (002) et (103) correspondant à la phase de l'oxyde de zinc (ZnO). L'orientation préférentielle des plans réticulaires (hkl) de ces couches dépend étroitement de la composition de zinc. Elle change progressivement de la direction [111] vers la direction [311] quand la composition de zinc x augmente. L'étude optique montre une faible transmission des couches élaborées (environ 50%) et elle diminue quand la composition de zinc x augmente. Cette étude a mis en évidence deux gaps optiques directs, dont les valeurs sont 1.50 eV pour le premier

gap et 2.16 eV pour le deuxième gap. L'étude par la spectroscopie Raman a mis en évidence cinq modes de vibration conformément a ce qu'est prévu par la théorie du groupe.

Mot clés : *couche mince, $Zn_xCo_{3-x}O_4$, Spray, Morphologie, Structure, Optique, Spectroscopie Raman.*

PB67

Simulation 2D de la caractéristique courant-tension d'une diode PIN à base du silicium polycristallin

A.RABEHI[1], M.AMRANI[1] , M.MOSTEFAOUI[1] , A.ZIAN[1]

[1]*Laboratoire de Microélectronique Appliquée, Université Djillali Liabés, B. P. 89, 2200 Sidi-Bel-Abbès, ALGÉRIE*

Rab_ehi@hotmail.fr

Dans se travail, nous nous intéressons au calcul des tensions de claquage par effet d'avalanche dans la diode PIN à bas de silicium polycristalline. Nous avons mis en place un programme de simulation 2D de la tension de claquage des diodes PIN à bas de silicium polycristalline. Dans ce cas nous avons résolvons numériquement le système d'équations partielles formé par l'équation de Poisson et les deux équations de continuité qui tiennent en compte l'effet de l'ionisation par impact. Par conséquent nous allons obtenir la caractéristique courant – tension (I-V) de la structure polarisée en inverse qui peut comprendre l'effet de claquage.

PB68

Theoritical investigation of GaN

H. ACHOUR, S. LOUHIBI-FASLA, F.MANA

Ecole nationale polytechnique d'Oran, BP 1523, El M'Naouer, 31000 Oran, ALGERIA.

hafidaachour@yahoo.fr

Gallium nitride (GaN) and other nitrides of the group III elements are important materials for the fabrication of various semiconductor devices such as short- wavelenght light-emitting diodes (LEDs), laser diodes and optical detectors, as well as for high temperature, high power, and high-frequency devices [1-7]. Using the first principles method of the full potential linear augmented plane waves (FPLAPW), the structural properties of GaN are investigated. Through the quasi-harmonic Debye model, in which the phononic effects are

considered, the dependences of the volume, the bulk modulus, the variation of the thermal expansion α, as well as the heat capacity C_v are successfully obtained in the whole range from 0 to 30 GPa and temperature range from 0 to 1000 K.

Kleywords : *GaN , FP-LAPW , GGA, Quasi-harmonic Debye model .*

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PB69
MECHANICAL CHARACTERIZATION OF AN ALUMINUM ALLOY WELDED BY TIG METHOD

N. SASSANE ; N. E. BELIADOUH

Laboratory of LMGM, Department of Metallurgy, Faculty Of technology, Badji-Mokhtar
BP12-Annaba University, 23000 ALGERIA.

nani2_fr@yahoo.fr

The alloys of the 6000 series (AlMgSi), despite the fact that they are soaking, these alloys have good weldability. Aging after welding or income to restore the mechanical properties. TIG welding or GTAW (Gaz Tungsten Inert Arc Welding) is a method wherein the arc between the arc glow and the workpiece a tungsten electrode in an infusible atmosphere formed by an inert gas which protects the electrode and the melt. This study deals with the TIG welding of aluminium alloy AlMgSi and structural characterization by light microscopy, Vickers microhardness and scanning electron microscope.

***Key words**: Al-Mg-Si, TIG welding, structure, microhardness.*

PB70

Modélisation d'un panneau solaire photovoltaïque par la méthode des éléments finis

Naima BOULFAF [1], Jamal CHAOUFI [2], Jean-Christophe Dupré [3], Claude Vallée [4], Kossi Atchonouglo [5], Abdallah Elorf [6], Abdelaziz Ghafiri [7], Elhanafi Arjdal [8], Hassan Fatmaoui [9], Arnaud Germaneau [10].

1 Laboratory of Electronics, Signal Processing and Modelling Physics, Department of Physics,
Ibn Zohr University, 80000 Agadir, Morocco.
2 Institute P' UPR, University of Poitiers, Poitiers 3346 CNRS, France.
naimaboulfaf@gmail.com

Les capteurs solaires photovoltaïques présentent des problématiques intéressantes qui nécessitent une prise en charge. Parmi ces préoccupations, nous pouvons citer les problèmes d'augmentation de la température des cellules solaires. L'objectif de notre travail est d'étudier théoriquement et numériquement le comportement thermique d'un capteur solaire photovoltaïque soumis à un flux solaire, à travers la détermination du champ de température dans ses différentes couches, en réalisant un programme de calcul numérique du champ de température dans le cas tridimensionnel. Notre démarche est basée sur la méthode des éléments finis. La simulation numérique à l'aide du logiciel CASTEM va nous permettre d'étudier numériquement l'influence des différents paramètres sur la température du capteur. Les résultats obtenus permettent de dire que le panneau photovoltaïque est un générateur d'énergie thermique[1] qui peut être exploité pour chauffer de l'eau et de l'air et vont nous servir par la suite, comme base de travail pour aborder un problème plus général qui est celui d'un capteur hybride photovoltaïque thermique à eau et à air.

***Mots clés**:* Photovoltaïque; Méthode des éléments finis; Champ de température; hybride; numérique.

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PB71

Identification of Mechanical Parameters of Materials: problem directly

E. ARJDAL[1], J. CHAOUFI[1], A. GHAFIRI[1], H. FATMAOUI[1], C.VALLEE[2]

[1] Laboratoire d'Electronique.de Traitement du signal et de Modélisation Physique, Département de physique, Université Ibn Zohr, 80000 Agadir, Maroc

[2] Institut P' UPR, Université de Poitiers, 3346 CNRS Poitiers, France

Adham.1000@gmail.com

The purpose of this work is to set the numerical bases before approaching the study of the identification of the mechanical parameters of elastic behavior materials. Indeed, most part of the mechanical tests do not allow to identify these mechanical parameters, the use of finite element method calculations to design structures is limited by a poor knowledge of the mechanical properties. It is in this context that arises the inverse analysis problematic [1] [2]. What information, concerning the parameters of the behavior laws of materials, it is possible to obtain from the in situ measures and which numerical technique allowing to obtain a determination of these parameters precisely and systematicaly? In this work we present a new way of proceeding by proposing an easily useful formulation by a treatment of the inverse problem. The problem so found is a differential system instead of a partial derivative problem. The resolution of the direct problem lead to obtain convincing results. These last ones so found are in agreement with the simulation by a commercial computer code. This will allow us afterward to approach without apprehension the inverse problem by proposing a technique of systematic identification by using the database beforehand definite [3].

***Keywords**: mechanical parameters, identification, direct problem, inverse problem*

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PB72
L'effet de la position et la taille de la fissure sur la valeur du facteur d'intensité de contraintes

A.BALTACH, A.SID AHMED, A AID, A BENHAMENA.
Laboratoire LPQ3M, Département de génie mécanique, Université de Mascara, Mascara 29000, Algérie.
baltachabdelghani@yahoo.fr

Le but de ce travail est d'analyser la gravité des défauts et d'étudier le degré d'endommagement des structures fissurées sous différentes conditions de chargement. La méthode des éléments finis en 2D deux dimensions basées sur le calcul de l'intégrale J ainsi le facteur d'intensité de contrainte pour analyser le comportement à la rupture de ces structures. L'effet de la position et la taille de la fissure sur ces deux paramètres a été mis en évidence. Les résultats obtenus par différentes méthodes montrent que l'analyse numérique a donné une bonne corrélation avec les résultats théorique.

Mots clés : *Rupture, fissure, facteur d'intensité de contrainte, endommagement.*

PB73
L'UTILISATION D'UNE FIBRE VEGETALE LOCALE COMME RENFORT DANS LES MATERIAUX COMPOSITES

S. IKHLEF *, S. NEKKAA and N. HADDAOUI
Laboratoire Physico-Chimie des Hauts Polymères. Département de Génie des Procédés, Faculté de Technologie. Université Ferhat Abbas Sétif (19000), ALGERIE
i_samah@hotmail.fr

Les avantages les plus importants des polymères sont la facilité de mise en œuvre, la productivité et la réduction des coûts. Pour de nombreuses applications, les propriétés des polymères sont modifiées en utilisant des renforts pour optimiser les propriétés. Les matériaux polymères renforcés par des fibres synthétiques, comme les fibres d'aramide, les fibres de carbone ou les fibres de verres sont très utilisés dans divers domaines d'application, comme ceux de l'automobile, de la construction, de l'aéronautique, et des sports. Les fibres de verres sont les plus utilisées grâce

à leur faible coût, leur facilité de production et leurs propriétés mécaniques spécifiques importantes. Cependant, le problème rencontré lors de l'utilisation de ces matériaux vient de leurs impacts négatifs pour l'homme et pour l'environnement (allergie de la peau, cancer pulmonaire…etc.). Les composites renforcés de fibres naturelles ont donc attiré une attention de plus en plus grande en raison de leur faible coût, leur densité peu élevée, leur biodégradabilité et leur disponibilité, leur facilité de mise en œuvre, leur haut module spécifique, et leur capacité à être recyclé, etc. Ces avantages présentent de l'intérêt pour des applications dans divers domaines comme par exemple la vie quotidienne (mobilier, plancher, pots…), l'industrie automobile…, qui exigent des matériaux légers à haute performance, des possibilités de recyclage, le minimum d'impact sur l'environnement, et une réduction du coût de la matière. Les fibres naturelles sont hydrophiles, donc incompatibles avec les thermoplastiques hydrophobes, tels que les polyoléfines et ont une faible résistance à l'humidité. Ces deux caractéristiques sont des points faibles pour l'utilisation des fibres végétales comme renfort de polymère. Il est alors nécessaire de les améliorer de façon à ne pas pénaliser les propriétés mécaniques. Un autre facteur important pour l'obtention de propriétés mécaniques élevées est la dispersion des fibres. Ces différents problèmes constituent les principales limites à l'utilisation de ces fibres comme renfort dans les polymères. L'importance des interactions à l'interface entre la matrice polymère et les fibres a été largement reconnue dans l'amélioration de la stabilité hygrothermique et des propriétés mécaniques des composites renforcés par des fibres naturelles. L'objectif de notre travail est l'amélioration de l'interface polymère/charge par un traitement chimique à différente temps et à différentes températures pour améliorer les propriétés mécaniques et rhéologiques des composites un base de polyéthylène basse densité et farine de Genêt d4espagne.

Mots-clés: *Composites, Genêt d'Espagne, Charges végétales, Modification chimique, Polyéthylène.*

PB74

Étude, modélisation et Simulation des Paramètres optoélectroniques d'une diode Laser à puit quantique Structurée $Ga_xAl_{1-x}As(p)/GaAs(n)/Ga_xAl_{1-x}As(n)$

A.HOCINI, Z. BENAMARA , A.RABEHI

Laboratoire de Microélectronique Appliquée, Université Djillali Liabés, B. P. 89, 2200 Sidi-Bel-Abbès, Algérie

raouf_28@yahoo.fr

L'objectif de ce travail est l'étude des lasers à base d'hétérojonctions de semiconducteurs III-V. L'étude du dispositif Laser à semi-conducteurs GaAs-AlGaAS (notions de base des lasers, et propriétés optoélectroniques) qui se limite au régime stationnaire du laser a été présentée. La simulation par la partie LASER du logiciel de simulation SILVACO ATLAS, a permis d'éclaircir l'influence de quelques paramètres du laser étudié.

PB75

Structural, Electrical and Optical properties of Fe doped SnO_2 deposited by spray pyrolysis technique

C. NASSIRI[1] , M. LOGHMARTI[1] , A. HADRI[1] , L. LAANAB[2] and A. MZERD[1].

[1] LPM, Faculty of Science, Mohammed V University , B.P.1014, Rabat-Morocco

[2] LCS, Faculty of Science, Mohammed V University , B.P.1014, Rabat-Morocco

chourouk.nassiri@gmail.com

In this work, we report structural, electrical, and optical characterization of iron (Fe) doped tin oxide thin films, which have been deposited by spray pyrolysis technique. X-ray diffraction and Scanning electron micrographs are used to determine respectively the nature of the formed phases and showed homogeneity of the surface. It is observed from optical measurement that the optical transparency (T %) of SnO_2:Fe films in visible spectra is decreased from 90 % to 75 % and the calculated energy gap values is around 3.78-3.9eV. From Hall Effect measurements the electrical resistivity (ρ) increases from 2.57 10^{-1} (Ω.cm), to 1.2 10^{2} (Ω.cm) for Fe-doping.

PB76

Magnon contribution to the magnetic properties of the [Fe / GaAs] super-lattice

H. ELMOUSSAOUI, A FAHMI, M.E.BENTAYEBI , M. FAHOUME AND A.QACHAOU*

LPMC, Department of Physics, Faculty of Science, University Ibn Tofail, BP 133, Kenitra 14000, Morocco.

ahqachaou@yahoo.fr

In this work, we studied magnetic properties of the (Fe/GaAs) super-lattice for various thicknesses of the iron magnetic layer and for a varying applied magnetic field. This study is performed in the framework of the Heisenberg model. Excitation spectrum and magnetization per spin were calculated using the retarded Green functions method. The comparison between calculations and experimental measurements of magnetization per spin permitted us to obtain a very satisfactory estimation of the exchange integrals. A numerical study of the surface anisotropy and dipolar interaction combined effect is also realized.

Keywords : *exchange integral , magnon , super-lattice, Heisenberg Hamiltonian, spin wave*

PB77

Effect of bias stress on the capacitance voltage variations of HfO_2 Metal Insulator Metal capacitors

O. KHALDI,[a,b] F. JOMNI[b], P. GONON[b] , B. YANGUI[b]

[a] *Laboratory of Materials Organization and Properties, El Manar University, 2092 Tunis, Tunisia.*

[b]*Microelectronics Technology Laboratory (LTM), University of Grenoble (UJF), CNRS, avenue des Martyrs, 38054 Grenoble Cedex 9, France.*

othmen.khaldi@gmail.com

This paper is devoted to the study of the effect of bias stress on the capacitance voltage variations of Hafnium oxide. The electrical parameters are investigated for different time delay of the stressed $Au/HfO_2/TiN$ MIM capacitors. It was found that the capacitance voltage C-V characteristic degrades with bias stressing. The C-V plots correlates with the SILCs on I-t characteristics. For long delay of stressing bias, the capacitance C-V decreases and saturate when conduction paths are created. Therefore, the Thermal Breakdown (TBD) is reached and a plateau appears in the C-V characteristic. The present study allows the description of the degradation of electrical properties of HfO_2 films with a different way than used in the literature.

Keywords **:** *Thermal Breakdown, bias stress, degradation of electrical properties, HfO_2*

PB78
Hot carrier stress in TMOS

Y. ENNAJHI, M. OUTIZI, M. ELYAGOUBI, M.BENDADA and M. MABROUKI

Laboratoire Génie Industriel Faculté des Sciences et Techniques Université Sultan Moulay Slimane Béni Mellal

outizimustapha@gmail.com

The object in this work is to study the degradation mechanisms, related to hot-carrier, in the characteristic parameters of the body-drain junction of Mosfet device.

The stress conditions were applied to the transistor using $V_G = V_D/2 = 7$ Volts and $V_G = V_D = 7$ Volts during 4 hours.

Figure 1 point out the hot-carrier cause a significant increases of density of oxide trapped charges and of the interface states and this increase is monotonically during the entire stress.

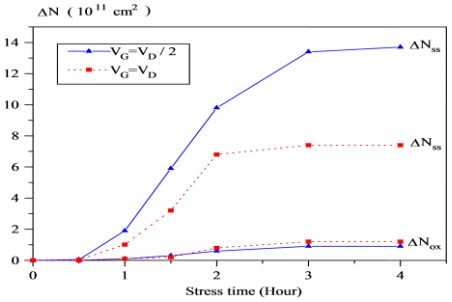

Figure 1: Density of interface states (ΔN_{ss}) and oxide trapped charge (ΔN_{ox}) during stress at $V_G=V_D/2$ and at $V_G=V_D$.

Figure 2 points out an increase of the reverse recombination current (I_{0r}) of the stressed device, compared to the virgin device that reflects the hot-carrier damage in the transient region of the junction and at the oxide-semiconductor interface near the junction.

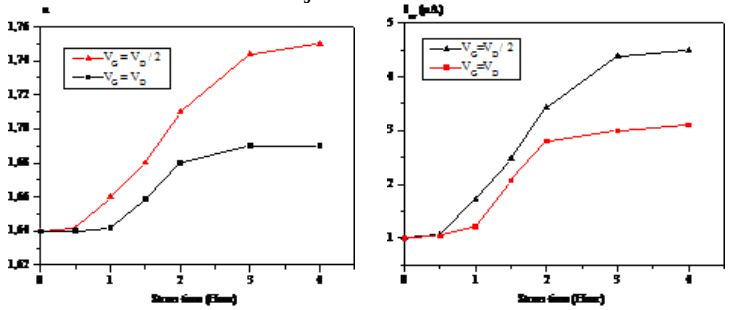

Figure 2 : a-The body-drain junction ideality factor (n) versus time plots for device stressed at $V_G=V_D/2$, and stressed at $V_G=V_D$. b- *The reverse recombination current (I_{or}) of the body-drain junction versus time plots for device stressed at $V_G=V_D/2$, and stressed at $V_G=V_D$.*

An increase of p-n junction ideality factor "n" implies carrier recombination via traps at the interface and in the junction space-charge region. These higher than unity ideality factor values indicate high values of the traps density and denote degradation in the junction due to recombination losses. This is confirmed by the high sensitivity, shown in fig. 2b, of the reverse current I_{or}, to the stress. Figure 2 show that the reverse current recombination Ior and the ideality factor n as well as the states (ΔN_{ss}) increase with time during stress, and this increase is significant in the region of maximum substrates current ($V_G= V_D/2$). These results confirm again that the degradation of physical parameters transistors depends on the applied stress bias conditions and is mainly caused by the interface states.

***Keywords**: Hot, carrier, stress,device,TM*

PB79

Etude des propriétés électriques de polymère préparé par spin coating

M. OUTIZI[1], Y. ENNAJHI[1], M. ELYAGOUBI[1], M.BENDADA[1], A. OUERIAGLI[2], R.M. LEBLANC[3]et M. MABROUKI[1]

[1]Laboratoire Génie Industriel Faculté des Sciences et Techniques Université Sultan Moulay Slimane Béni Mellal Maroc

[2]Laboratoire physique des solides et des couches minces FSSM Marrakech Maroc

[3] supramolecular center University of Miami USA

Mus_mabrouki@yahoo.com

Organic semiconductors have attracted a large interest in the recent years because they show a variety of electro-optic and electrical proprieties in addition to the ease of fabrication and processing. Which make them promising as photovoltaic and optoelectronic devices [1-3]. In this work, electrical proprieties of ITO/PPEEB/Al structure have been investigated. The structure is prepared by spin-coating where PPEEB is dissolved in chloroform solvent then coated on the substrate, followed by Al evaporation in vacuum. From the s transmission spectre of PPEEB films deposited on glass shown in figure 1

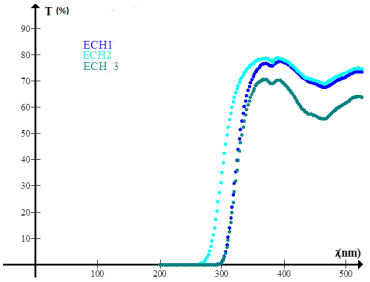

Figure1: PPEEB spectre of transmission

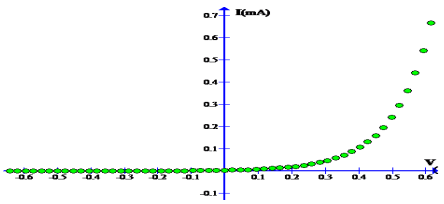

Figure2: ITO/PPEEB/Al I-V characteristic

The transition observed around 420 nm is is corresponding to electron transition between the valence band and conduction band equal to the gap energy of polymer Eg equal to 4eV. Figure 2 show a typical characteristic of ITO/PPEEB/AL Schottky diode and pass through the origin.

***Keywords**: Polymer, Diode, I-v Characteristic and PPEEB*

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PB80

Infrared spectroscopy characterization of SiO_xN_y films deposited by LPCVD

B. KAGHOUCHE[1], F. MANSOUR[1], S. ABADLI[1], E. B. PEREIRA[2]
[1] *LEMEAMED Laboratory, Department of Electronics, University Constantine 1, 25000, Algeria*
[2] *LAAS-CNRS, 7av. du colonel Roche, 31077 Toulouse Cedex 4, France*
b.kaghouche@gmail.com

Silicon oxynitride SiO_xN_y have excellent proprieties such as low absorbance, excellent control of the refractive index, high thermal stability and resistance to oxidation. Therefore, these films have various applications in the field of waveguides, optoelectronics, chemical sensors and solar cells. The studied films in this work were deposited on (100) silicon single-crystal wafer by low pressure chemical vapour deposition (LPCVD) technique at temperature of 850^0C during 50 minutes using a mixture of dichlorosilane (SiH_2C1_2), nitrous oxide (N_2O) and ammonia (NH_3). The films were deposited at

different value of relative gas flow ratio of N_2O and NH_3 ($r=NH_3/N_2O$) while the gas flow of SiH_2C1_2 was kept constant at 200 sccm. Refractive index and thicknesses of the films were deduced by spectroscopic ellipsometry. Spectroscopy Fourier Transformation Infrared (FTIR) is used to study the evolution of the chemical nature of SiO_xN_y films prepared at different ratios of gas flow. This technique allowed us to identify the chemical bonds present in the layers of silicon oxynitride. The chemical bonds were determined by the localization of the absorption bands on a spectral region which extends between 400 and 4000 cm^{-1}. The predominant absorption band was observed in the region 650-1300 cm^{-1} and deconvolution of this band can be assigned to Si-O and Si-N groups. We also found that the Si-O bond is located on the absorption peak at 450 cm^{-1}. Moreover, the localization of the peak at 1062 cm^{-1} associated to the stretching vibration of the Si-O bond for the sample deposited at low gas flow ratio (r=0.03) shows that the chemical composition is very close to the silica (SiO_2). We have shown that the increase of gas flow ratio and therefore the increase of the rich nitrogen precursor (NH_3) leads to broadening of the predominant absorption band and a shift of the main peak to the lower values wavenumbers. This behavior is due to the enhancement of Si-N bonds in SiO_xN_y layers. These results indicate that the incorporation of nitrogen affects the optical and physico-chemical properties of SiO_xN_y films.

***Keywords**: Silicon Oxynitride, LPCVD, FTIR*

PB81

Magnetic field effect on the evolution of magnon population properties in the [Co/Ag] super-lattice

M.E.BENTAYEBI, A.FAHMI , H.ELMOUSSAOUI AND A.QACHAOU

LPMC, ibn Tofail University, Faculty of Sciences, Kenitra 14000 BP133, Morocco.

ahqachaou@yahoo.fr

The magnetic field effect on the properties of magnon population in the super-lattice Co/Ag is investigated within the framework of spin waves theory. The corresponding Heisenberg Hamiltonian is diagonalized using the Green functions method. Excitation spectrum and magnetization per spin are calculated. The compared measured and calculated magnetizations are in good agreement allowing us to deduce exchange integrals J whose values are

in coherence with what is found usually for this type of super lattices made of 3d metal transition. A study of the combined effect of dipolar interaction and surface anisotropy is also reported.

Keywords: *spin waves , Heisenberg Hamiltonian , Green functions , super lattice, magnon.*

PB82

Effect of interphase on the effective permittivity of carbon black filled polymer composites

N. ARIBOU,[1] S. ELBOUAZZAOUI[1], M. E. ACHOUR,[1,*] and C. BROSSEAU[2]

[1]Laboratoire des Systèmes de Télécommunications et Ingénierie de la Décision, Département de Physique,
Faculté des Sciences, Université Ibn Tofail, B.P. 133, 14 000 Kénitra, Maroc
[2] Université de Brest, Lab-STICC, CS 93837, 6 avenue Le Gorgeu, 29238 Brest Cedex 3, France

sachoum@yahoo.fr

This study deals with the effect of the interphase on the effective permittivity of carbon black (CB), i.e. Monarch700 and Sterling, filled polymer (DGEBA epoxy) composites. In order to consider the interactions between the filler particles and the matrix we introduce the interphase volume fraction as a parameter of the model. This interphase volume fraction characterizing the interphase region between the polymer chains and the CB particles depends of the CB concentration. One output of this model is that it allows us to estimate the volume and intrinsic permittivity of the interphase by fitting with experimental data over a broad range of frequency of the electromagnetic wave.

PB83

Modelling the DC electrical conductivity of carbon particles reinforced polymer composites

S. A. ELHAD KASSIM[1], M. E. ACHOUR[1,*], LC COSTA[2], F LAHJOMRI[3]

[1] LASTID Laboratory, Physics Department, Faculty of Sciences, Ibn Tofail University, B.P:133,
14000 Kenitra, Morocco
[2] I3N and Physics Department, University of Aveiro, 3810-193 Aveiro, Portugal
ENSAT, Abdelmalek Essaadi Univ. Tanger, Morocco

sachoum@yahoo.fr

This work presents a study of the DC electrical conductivity of three series of composites, constituted by conducting particles (carbon black, carbon

nanotubes and carbon fibers) dispersed in an insulating epoxy matrix. The experimental values of the electrical conductivity were compared, in a first step, to Maxwell-Garnett and Bruggeman mixing laws. We show that these laws correctly account for the experimental results at low conducting particle concentrations. At concentrations higher than a few percent, the laws fail to interpret experimental results. The calculation of the effective conductivity, based on the McLachlan and Mamunya's mixing laws, using adjustable parameters in each one of them, reproduces the measured values very well. We show that the obtained parameters are not identical for these three series of samples. It is concluded that the fit of the experimental data with mixing laws and effective medium equation predictions has limited applicability, as these models assume a particular shape of dispersed filler particles in the matrix.

PB84

Experiments on the compression behaviour of Ti6Al4V for a wide range of strain rates

A. DARSOUNI[1], D. TOUALBIA[1, 2] and L. DARSOUNI[1]

[1]Laboratory of Metallurgy and Material Engineering, Badji Mokhtar University, Annaba 23000, Algeria

[1, 2]Département de maintenance, centre Universitaire de Souk Ahras- Département de maintenance, centre Universitaire de Souk Ahras- Laboratory of Physic and Mechanic of Materials, University Paul Verlaine, Metz, 57000, France

darsouniabdel@yahoo.fr,

In this paper, the thermo-viscoplastic behaviour of Ti6Al4V under compression loading is analyzed. Experiments using two different setups have been performed. Tests at low strain rates were conducted using hydraulic machine. Dynamic tests were carried out for strain rates in the range . For that task, it was used a modified Hopkinson bar which is based on direct-impact technique. For strain rate level higher than10^2 s^{-1}, the process of plastic deformation in most metals and alloys is assumed adiabatic [1]. The heat generated inside the material due to plastic deformation cannot be transmitted. The increase of temperature is dependent on the flow stress of the material. It has particular relevance in titanium alloys, which are characterized by their high flow stress level. In this work, special attention is focused on this phenomenon

Titanium alloys are considered among the most important metal alloys in engineering. They play a relevant role in several application fields, for example in aeronautical, chemical, marine and military industries [2-3].

Titanium alloys exhibit elevated strength-to-weight ratio, good fatigue performance, high toughness and considerable work-hardening.
In the present paper the behaviour of Ti6Al4V under compression loading is studied. Using two different experimental techniques a wide range of strain rates has been covered during the test. Due to high flow stress level exhibited by Ti6Al4V alloy, adiabatic heating at high strain rates plays a relevant role on the material behaviour. Thermal softening is analytically calculated by application of the first principle of thermodynamics. Its influence on the material behaviour is shown up. Obtaining the isothermal behaviour of the material at high strain rates allows for defining rate sensitivity of the material. Such procedure is useful for forthcoming modelling of the material behaviour.

Keywords: *Ti6Al4V, thermo-viscoplastic behaviour, Hopkinson bar, Rheology*

PB85

Etude des couches galvanisées à chaud d'un acier à bas carbone obtenues par différents temps d'immersion

L. DARSOUNI[1], A. KHETTACHE[1], S. ATAILIA[1], M.Z. TOUHAMI[2], M. BACCOUCHE[1]

1: Laboratoire LM2PM, Département de Métallurgie, Université Badji Mokhtar Annaba, BP 12 23000 Annaba

2: Laboratoire de Fonderie, Département de Métallurgie, Université Badji Mokhtar Annaba, BP 12 23000 Annaba

chlamia@hotmail.fr

Ce travail est basé sur Le revêtement galvanisé de l'acier qui est le résultat d'une réaction métallurgique entre le zinc et le fer. Cette transformation conduit à l'apparition de couches de composés intermétalliques qui sont en générale des solutions solides zinc-fer formées sous l'effet des mécanismes de diffusion – précipitation entre le bain de l'alliage de zinc et le fer de substrat d'acier. Cet effet pourra être favorisé par une énergie environnant conditionnée par les paramètres désirés qui sont le temps d'immersion et la température de traitement. La caractérisation physique, chimique, structurale et mécanique trouvera son essor lors de cette étude. En effet, la caractérisation combinée par diffraction des rayons X en incidence rasante, la microscopie électronique à balayage et l'analyse EDAX, nous a révélé essentiellement, la présence en extrême surface d'une fine couche d'oxyde de zinc suivie de la phase Eta, puis de la phase

Zêta et enfin de la phase Gamma. On note aussi la présence du composé intermétallique Fe_{11} $Zn_{40.}$ A signaler, que la formation des ces couches est observée pour tous les temps d'immersion imposés à nos échantillons. La caractérisation par XPS a montré une forte contamination sur la surface de galvanisation. L'essai électrochimique à montrer une nette amélioration de la résistance à la corrosion de la couche galvanisée en comparaison avec l'acier non revêtu. Suite à l'essai de pliage on a observé, l'apparition de fissures de différentes taille et nombre sur toutes les éprouvettes utilisées. Nous supposons que, cela peut être lié à la formation des sous couches fragiles. Le procédé de galvanisation à façon doit être réservé de préférence aux pièces ne subissant pas une mise en forme ultérieure. Par contre, il est recommandé pour les pièces utilisables en l'état après leur galvanisation. Ce qui a été confirmé par des observations constatées dans d'autres travaux.

Mots clés : *galvanisation, diffusion, précipitation, composés intermétalliques, acier, zinc.*

PB86

Optical emission from kr^+ ion-bombarded surface Nickel and its oxide NiO

L. JADOUAL[1*]. A. EL BOUJLAIDI[1], M. AIT EL FQIH[1, 2], A. AAMOUCHE[3] and A. KADDOURI[1]

[1]Equipe Spectroscopie & Imagerie Atomiques des Matériaux, Université Cadi Ayyad, Marrakech, MAROC

[2] Faculté Polydisciplinaire, Université Chouaib Doukkali, El Jadida, MAROC

[3] Equipe Structure et Interactions avec les Surfaces de Matériaux Faculté Polydisciplinaire, Safi, MAROC

jadouallamiae@yahoo.fr

Sputtering of solid material through an energetic ion beam involves ejection of particles in excited electronic states[1]. The competition between radiative and nonradiative desexcitation of these particles can be elucidated by optical emission spectroscopy, developed in the laboratory by our team under the acronym SIPS (sputter- induced photon spectroscopy)[2].In this work, we have studied optical emission observed during 5 keV Kr^+ ion bombardment of clean Ni surface and NiO compacted powders at base pressure ($<10^{-7}$ torr). We also performed the same experiments with the introduction of oxygen gas ($\sim10^{-5}$ torr). Optical spectra were recorded between 280 nm and 400

nm and consist of a series of sharp lines which are attributed to neutral exited Ni. No lines attributed to excited ions were observed and no continuum radiation was detected in the explored spectral range. The differences in photon yield from the oxide, the oxygenated Ni and the clean target are discussed in terms of the electron-transfer processes between the excited sputtered and electronic levels of the two types of surfaces[2,3]. We have also examined the existing processes of ionisation, excitation, neutralisation and Auger de-excitation of atomic particles near solid surfaces.

***Keywords**:* Sputtering, optical emission, nickel, nickel-oxide, electron-transfer model.

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PB87

L'effet du dopage sur la conductivité ionique de Niobate de Lithium.

M. BOUSSELAMTI, F. BENNANI
LPMC, Département de physique, Université ibn tofail, KENITRA, MAROC
f_bennani@yahoo.fr

Dans le but d'étudier l'effet du dopage sur la conductivité ionique des échantillons de Niobate de Lithium LiNbO3 (LN) , nous avons analysé les diagrammes d'impédance complexe mesures antérieurement et nous avons déterminé les différentes polarisations contribuant à la conductivité ionique.

L'étude de l'évolution de logσ (LN) en fonction de 1000/T a montré l'existence d'un changement de pente, contrairement à ce qui a été observé sur son isomorphe le Tantalate de Lithium LiTaO3. Dans ce travail nous essayons de comprendre le phénomène de conduction dans ces matériaux isolants et en savoir l'agent responsable en fonction de la température et en conséquence donner une explication au changement de pente observé.

PB88

Electro-optical and dielectric characterizations of electroclinic effect near to N*-SmA-SmC* multicritical point

J. HEMINE[1,2,3], A. DAOUDI[2, 3], C. LEGRAND[2, 4], A. EL KAAOUACHI[5], A. NAFIDI[5]

[1]*Université Hassan II Mohammedia-Casablanca, LPMC-FSTM, Mohammedia, Maroc*

[2]*Université Lille Nord de France, F-59000 Lille, France*

[3]*ULCO, UDSMM, F-59140 Dunkerque, France*

[4]*ULCO, UDSMM, F-62228 Calais, France*

[5]*Université Ibn Zohr, LPMC, Faculté des Sciences, BP 28/S 80000 Agadir, Maroc*

jamal.hemine@yahoo.fr

We report in this work, the electro-optic and dynamic properties of three pure ferroelectric liquid crystals (FLCs) materials (C10, C11 and C12) exhibiting the chiral smectic C (SmC*)-smectic A (SmA)-cholesteric (N*) phases [1]. From electro-optic investigations, the tilt angle and spontaneous polarization were determined as a function of temperature. In the dielectric measurements carried out without a dc bias field, we studied the soft-mode relaxation mechanism in the SmA phase. From experimental data and using the theoretical Landau model around the N*-SmA-SmC* phase transitions, we evaluated the soft mode rotational viscosity and the electroclinic coefficient [2, 3]. The main result in this work, is that a relaxation process usually observed in the SmA phase is also observed in the cholesteric phase (N*) phase for two homologues (C10 and C11, see figure below) [4] and is interpreted as a soft-mode-like mechanism. This mechanism is related to the appearance of smectic order fluctuations within N* phase whose amplitude is increased when approaching the N*-SmA-SmC* multicritical point.

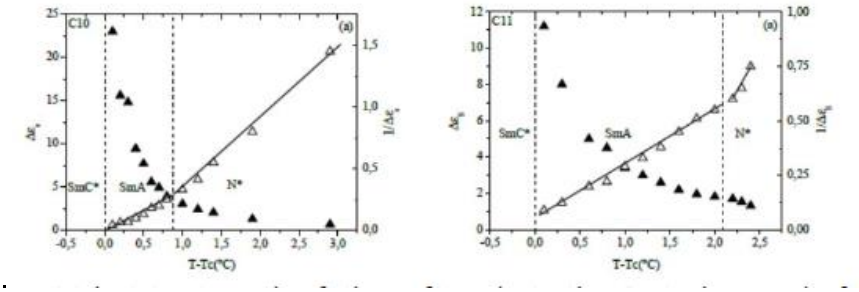

Figure. *Dielectric strength of the soft-mode in the SmA phase and of the relaxation mechanism observed in the N* phase versus temperature for C10 and C11 materials. The reciprocal dielectric strength (1/Des) is also reported.*

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PB89

Influence of the inter-electrodes distance on Argon DC glow discharge characteristics.

S. REBIAI, F. BOUANAKA

Laboratoire de microsystèmes et instrumentation, Département d'Electronique, Faculté des sciences de la Technologie, Université Constantine 1, Route d'Ain El Bey, 2500Constantine, Algérie

s_rebiai@yahoo.fr

Low pressure plasma technology provides several varieties of applications in micro-electronic industry and materials surfaces processing. There have been recent interests in the area of glow discharge plasmas applications, such as etching, semiconductor wafer processing and discharge lamps for lighting. Many theoretical and experimental studies are conducted to characterize and analyze these cold plasmas to improve and optimize the used processes. To form and maintain the plasma discharge, a voltage is applied to produce the ionization of the plasma gas. In this work, a theoretical model for a DC glow discharge at low pressure is developed. The model allows the determination of plasma characteristics distributions in 2D geometry. The proposed theoretical model is applied to collisional argon plasma in a reactor consisting of two plane parallel electrodes. The simulation is carried out using finite difference method. Matlab software is used, to solve the partial differential equations that govern the behavior of the discharge. The simulation results are illustrated in terms of spatial distribution of electron and ion densities, the electron energy, the potential and the electric field, for a gas pressure of 1 Torr and DC voltage of-250V. Since geometry plays an important role in plasma technologies, it is important to investigate the scaling of plasma reactor parameters such as the distance between the reactor electrodes.

Keywords: *Modeling, DC glow discharge, Argon plasma, finite difference method,*

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PB90

Temperature Dependence of Surface Potential Decay of Kapton Polyimide Films

Zehira ZIARI[1], Salah SAHLI[1], Azzedine BELLEL[2], Yvan SEGUI[3], Patrice RAYNAUD[3]

[1] *Université Constantine I, Laboratoire de Microsystèmes et Instrumentation (LMI), Faculté des Sciences de la Technologie, Constantine 25000, Algeria*
[2]*Université Constantine I, Laboratoire d'étude des Matériaux Electroniques pour Applications Médicales (LEMEAMED), Faculté des Sciences de la Technologie, Constantine 25000, Algeria*
[3]*Université de Toulouse, Laboratoire Plasma et Conversion d'Energie (LAPLACE), CNRS, INPT, Université Paul Sabatier, 118 Route de Narbonne, 31062 Toulouse Cedex, France*
zziari_zahira@yahoo.fr

Surface potential decay measurements of charged insulating materials have proven to be a simple and useful method to investigate the electrical properties of polymers. However, physical mechanism of the surface potential decay in polymer has not been fully understood. In this paper, the effect of the temperature on the surface potential decays measured on polyimide thin films (Kapton® HN DuPont Nemour) after corona charging in a point-grid-plate configuration has been investigated. The surface potential is recorded directly after corona charging using an electrostatic non-contact probe. The experimental results related to the effect of different charging voltage and temperature show that the decay rate increases with increasing voltage levels and temperature. Surface potential cross over phenomenon has been observed and occurs very early at higher temperature. The presence of the *cross over* phenomenon reveals that bulk transport process dominates the surface potential decay. The surface potential data were treated by numerical derivation with time, dV_s/dt transformation, which provided possibilities to deduce materials properties. The results of the surface potential decay rate dV_s/dt calculated for different charging temperatures shows two distinct regions with different potential decay rate.

***Keywords**: Corona charging, Surface potential decay, Charging temperature*

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B91

Hysteresis loops and susceptibility of a transverse ferrimagnetic Ising nanosphere

S. BOUHOU[1],*, I. ESSAOUDI[1,4], A. AINANE[1,2,3,4] F. DUJARDIN[3] and R. AHUJA[4]

[1]Laboratoire de Physique des Matériaux et Modélisations des Systèmes, (LP2MS) Unité Associée au CNRST-URAC 08, University of Moulay B.P. 11201, Meknes, Morocco.

[2]Max-Planck-Institut für Physik Complexer Systeme, Nöthnitzer Str. 38 D-01187 Dresden, Germany.

[3]Laboratoire de Physique des Milieux Denses (LPMD) Institut de Chimie, Physique et Matériaux (ICPM), 1 Bd. Arago, 57070, Metz, France.

[4]Condensed Matter Theory Group, Department of Physics and Astronomy, Uppsala University, 75120 Uppsala, Sweden.

sam_bouhou@hotmail.com

We use the effective-field theory with a probability distribution technique to investigate the magnetic properties of a magnetic nanosphere core/shell in the presence of both the longitudinal and the transverse field. Nearest-neighbor pair interactions are incorporated between the Ising spins in three parts that are core, core/shell and surface shell. The effects of the external field and exchange interactions between core/shell and in surface shell on the thermal magnetization and susceptibility of the nanosphere are examined. A number of interesting phenomena have been found.

***Keywords**: Effective field theory, Ferromagnetic nanosphere, Hysteresis loops.*

PB92

Polymères Conducteurs Solubles à base de Poly [(pyrrole-2,5-diyl)co(4-Nitro benzylidene)] par la maghnite-H+

H GHERRAS, A YAHIAOUI, A HACHEMAOUI

Laboratoire de chimie Organique, Macromoléculaire et des Matériaux (LCOMM),
Université de Mascara, BP 763 Mascara 29000, Algérie.

gherrashammou@yahoo.fr

Les polymères conjugués sont des matériaux intéressantes grâces à leurs propriétés de photo et d'électroluminescence [1]. Industriellement plusieurs amorceurs ont été utilisés pour préparer ces polymères conducteurs tels que l'acide sulfurique H2SO4, l'acide trifluoro de bore etherate BF3(OEt)2, et l'acide trifluoro acétique TFA [2]. Ces amorceurs présentent plusieurs inconvénients, ils ne sont pas récupérables, leur élimination ou neutralisation est pratiquement impossible et extrêmement coûteux. Les produits obtenus sont donc, contaminés par ces amorceurs et deviennent ainsi toxiques. Actuellement, les industriels cherchent à éviter l'utilisation de tels catalyseurs et des solvants organiques qui sont toxiques et non recyclables, ce qui pose de sérieux problèmes à la santé humaine et à l'environnement.Pour notre part et afin d'éviter tous ces problèmes nous proposons de préparer : le poly(2,5- diyl pyrrole-co-4.nitrobenzylidéne) par polymérisation du 4nitrobenzaldehyde avec le pyrrole en utilisant la Maghnite-H+ comme catalyseur, en solution et à température ambiante [3]. Le catalyseur utilisé est moins coûteux, non toxique et facilement récupérable.Le but de ce projet est de développer une nouvelle génération de cellules photovoltaïques beaucoup plus légères et performantes. Le principe est de remplacer les composés minéraux constituant la cellule photovoltaïque par ces polymères ou des molécules organiques. L'objectif est aujourd'hui d'accroître les rendements en améliorant l'efficacité de l'absorption de la lumière et en jouant sur les structures des polymères conducteurs synthétisés. Les cellules organiques du futur seront transparentes, flexibles et particulièrement minces. Installées sur les toits, les façades ou même les fenêtres, elles produiront le courant nécessaire à la consommation électrique des bâtiments. Adaptées aux téléphones portables et aux objets nomades, elles en fourniront l'alimentation électrique.

Mot clés: *Polymères conducteurs, pyrrole, 4-nitrobenzaldehyde, Cellules photovoltaïques.*

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PB93

Synthèse d'un polymère téléchélique Poly [(2-Méthyl-2-Oxazoline)-Allyle] en présence de la Maghnite-H$^+$

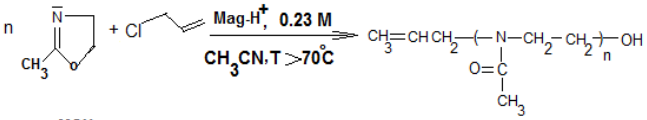
Y. GHILLAL, A. HACHEMAOUI et A. YAHIAOUI

[1]*Affiliations, Laboratoire de chimie organique, macromoléculaire et des matériaux (LCOMM);*

BP 763 Route Mamounia 29000, université de Mascara, Algérie

ghillal.amina@yahoo.fr

Les composés téléchéliques sont des oligomères linéaires ou des polymères linéaires de faible masse molaire ayant des groupes fonctionnels à une ou aux deux extrémités de la chaîne capables de réagir avec d'autres molécules[1, 2]. Dans ce travail nous avons réalisé la synthèse des polymères téléchéliques à base de Poly [(2-Méthyl-2-Oxazoline)-Allyle] par la polymérisation cationique par ouverture de cycle du 2-méthyl-2-oxazoline en présence du chlorure d'allyle comme initiateur et la Maghnite-H$^+$ comme catalyseur.



MOX PMOX-Allyle

La Maghnite utilisée est une argile de type montmorillonitique activée par l'acide sulfurique 0,23M et qui a fait preuve d'une bonne efficacité en polymérisant plusieurs monomères vinyliques et hétérocycliques[3], elle a été largement utilisée en tant que générateur de protons pour des réactions impliquant un mécanisme réactionnel cationique. La Maghnite-H+ utilisé est plus économique.Les polymères obtenus ont été caractérisés par différentes méthodes d'analyses: résonance magnétique nucléaire (RMN-^{1}H) et spectroscopie infrarouge (IR-FT). Et pour trouver les conditions optimales nous avons étudiés les effets des paramètres suivants:

La quantité du catalyseur, la température, la quantité d'initiateur, et aussi leurs influences sur le rendement.

Mots clés: *polymère téléchélique, polymérisation cationique, 2-Méthyl-2-oxazoline et Maghnite-H+.*

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PB94

Synthèse d'un polymère téléchelique (PECH fonctionnalisé) par la maghnite-H^+

H. MEKKAOUI[1], A. YAHIAOUI[1], A. HACHEMAOUI[1]

Laboratoire de chimie organique, macromoléculaires et de matériaux (LCOMM), Faculté des sciences et de la technologie, Université de Mascara, BP 763 route El Mamounia, Mascara 29000, Algérie.

houria_mekkaoui@yahoo.fr

L'objectif de notre travail, qui s'inscrit dans le cadre de notre étude, consiste à faire la synthèse d'un polymère téléchélique par la polymérisation cationique par ouverture de cycle de la polyépichlorhydrine fonctionnalisée par l'anhydride méthacrylique en présence de la Maghnite-H+, qui est une argile de type montmorillonitique activée par l'acide sulfurique (0,23M) et qui a fait preuve d'une bonne efficacité en polymérisant plusieurs monomères vinyliques et hétérocycliques. Dans la synthèse des polymères, en plus de la polycondensation et de la polymérisation en chaîne, il existe une autre grande méthode de polymérisation : il s'agit de la polymérisation par ouverture de cycle, qui a été très étudiée pour des différents groupes de monomères cycliques [1-3]) de types éthers, acétal, amide (lactame), ester (lactone) et siloxane. Cette polymérisation est largement utilisée dans l'industrie, en particulier pour l'oxyde d'éthylène.

Mots clés : *Epichlorhydrine, polyépichlorhydrine fonctionnalisée, anhydride méthacrylique, polymérisation cationique, Maghnite-H^+.*

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PB95
Structural Superconducting and Magnetic Properties of Iron substituted $Bi_2Sr_2CaCu_2O_{8+d}$

N. BOUSSOUF[1, 2]*, M.-F. MOSBAH[2]

[1]Faculty of Sciences, 20th August 1955 University, B.P.26 route d'El-Hadaiek, 21000 Skikda. Algéria.

[2] Material Science and Applications Research Unit, Physics Department, Mentouri University, Route de Ain-el-Bey 25017 Constantine, Algeria.

boussoufnora@yahoo.fr

The effect of substitution of the rare earth ion Fe at Cu site of Bi-2212 superconductor has been studied by varying Fe in the stoichiometric level. Polycrystalline Bi-2212 samples were synthesized by solid state reaction method. Phase analysis, micro structural observations and magnetic properties were carried out by X-ray diffraction (XRD), scanning electron microscopy (SEM), infrared spectra (IR) and A.C magnetic susceptibility measurement respectively. The X-ray diffraction patterns of all the samples indicate the presence of a parasitic phase Bi-2201 accompanying the main one (Bi-2212) and a decrease of the volume fraction of the Bi-2212 phase with Fe concentration. The material has a tetragonal lattice structure with *c* lattice parameter systemically decreasing as the Fe concentration increases. SEM photographs show that the Fe substitution affects the mechanism of the grains growth and increase the porosity of the structure. IR study shows that Fe doping has different effects on in-plane Cu–O(1) stretching modes, which can be well understood in terms of the changes of the crystal structure and the static attraction[1]. The AC magnetic susceptibility measurements show a decrease of the superconducting transition temperature T_c and an effect on the superconducting volume fraction. The decrease in T_c is explained by the substitution of Fe^{3+} in place of Cu^{2+} and the consequent change in chemical and electronic inhomogenities.

Keywords: *Superconductors, Fe doped Bi-2212, physical properties.*

PB96

Sol-Gel Derived Er-activated SiO_2 -TiO_2 and SiO_2 -HfO_2 planar Waveguides for 1.5 □m application in C band of telecommunication

A. BOUAJAJ[1], R. R. GONÇALVES[2], L. *ZAMPEDRI*[2], M. FERRARI[3]

[1] Département de Génie industriel ENSA – Tanger. Université Abdelmalek Essaadi, Tanger, Morocco

[2]Dipartimento di Ingegneria dei Materiali, Università di Trento, Via Mesiano 77, I-38050 Trento, Italy;

[3]CNR-IFN, Istituto di Fotonica e Nanotecnologie, via Sommarive 14, I-38050 Povo, Trento, Italy;

dbouajaj@yahoo.fr

Erbium actived (100-x) SiO_2-xTiO_2 and (100-x) SiO2-xHfO_2 with x=10, 20 planar waveguides have been prepared by sol-gel route. The films were deposited on v-SiO_2 substrates using dip-coating technique. The parameters of preparation have been chosen to optimize the waveguides for operation in the NIR region, and to increase the luminescence efficiency of the metastable $^4I_{13/2}$ state of Er^{3+}. The waveguides properties were determined by m-lines spectroscopy and loss measurements. Waveguide Raman and luminescence spectroscopy were used to obtain information about the structure of the prepared films and about the dynamical process related to the emission in the C telecom band of the Er^{3+} ions. The results are discussed with the aim of comparing the structural and optical properties of Erbium-activated silica-titania and silica-hafnia planar waveguides.

Keywords: *Erbium, films, sol-gel, silica-hafnia, optical amplifiers*

PB97

Etude cinetique de l'adsorption du bleu de methylene par la dolomie traitee thermiquement

ZAHAF FAIZA, OUADJENIA FATIMA[2], MAROUF REDA[3]

Laboratoire des Matériaux, Applications et Environnement, Université de Mascara, Algérie

zahaf.faiza@yahoo.fr

La recherche de nouveaux matériaux, susceptibles de développer des propriétés physico-chimiques intéressantes et utiles au domaine industriel, a toujours occupé une place de choix parmi les préoccupations des chimistes du solide. Parmi ces matériaux recherchés, nous retrouvons la dolomie. La

dolomite est un minéral incolore à blanc jaunâtre, formé de double carbonate de calcium et de magnésium. Elle est utilisée dans de nombreux secteurs industriels grâce à son apport en chaux et/ou en magnésie. Elle a été utilisée pour l'adsorption des composés de méthyle carboxylique cellulose (CMC)[1]. et de dioxyde de soufre[2]. L'Algérie possède un grand gisement, situé à Ouled Mimoun (Tlemcen). L'étude présentée, est consacrée à la caractérisation de la dolomie brute, et celle traitée thermiquement à différentes températures (D-800, D-900 et D-1000). Par la suite appliqué ces matériaux à la récupération du bleu de méthylène en milieu aqueux. L'analyse par DRX a révélé que la dolomie calcinéeà800°C, renfermel'oxyde de magnésium et le carbonate de calcium sous forme de calcite. La décomposition partielle de la calcite en CaO se manifeste à 900 °C. Au-delà, soit à 1000 °C, seuls les pics de CaO et de MgO sont observés. Les résultats de l'adsorption du BM sur nos échantillons, ont montré que le pH de la solution influe énormément sur la quantité adsorbée. Le modèle de Freundlich décrit convenablement nos données expérimentales. La réaction d'adsorption du BM suit bien la cinétique du pseudo-second-ordre.

Mots clés : *dolomie, colorant BM, adsorption, cinétique.*

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PB98

Helping in reducing of environmental pollution by producing new lead free solder alloys with Tin-base owns attracting physical properties.

Somaya M. M. AL-HINDAWEY , Mustafa KAMAL, Abu Bakr EL- BEDIWI

Physics Department, Faculty of Science, Mansoura University, Mansoura, Cairo, Egypt
somaya_mohamed_phy@yahoo.com

One of our aims in this life is to reduce and protect our environment from pollution by different ways. And also Intense International competition makes it necessary for the life and the need for new improved lead free fusible solder alloys. For that, our work in this search is specified with producing lead-free solder fusible alloys with suitable physical properties for the industrial using. So, we today introduce tin-based alloys with different concentration additions of bismuth which is rapidly solidified by using melt spinning technique. It's noticed that, by increasing the concentration of bismuth, there is increasing in the electrical resistivity of the alloy,

increasing in the melting point and decreasing the elastic modulus. These changes in the physical properties of these alloys is because of adding bismuth does changes in the Sn-Bi matrix which shown by X-ray diffraction analysis.

Key words: *Lead-free solder alloys; Melt spinning technique; X-ray diffraction; Electrical resistivity; Melting point; Elastic modulus.*

PB99

Anomalous collision frequency-dependent diffusion coefficient in a BGK model for surface diffusion

E. EL KORAYCHY[1], M. MAZROUI[1,], R. FERRANDO[2,] AND Y. BOUGHALEB[1,3]

[1] Laboratoire de Physique de la Matière Condensée, CNRST (URAC10), Université Hassan II- Mohammedia. Faculté des Sciences Ben M'sik, B.P. 7955, Casablanca, Morocco

[2] INFM and IMEM/CNR, Dipartimento di Fisica dell'Università di Genova, via Dodecaneso 33, 16146 Genova, Italy

[3] Hassan II Academy of Sciences and Technology, Morocco

elkoraychy.elyakout@gmail.com

The aim of the present paper is to study the diffusive motion of a particle in a two-dimensional periodic potential of triangular symmetry. The calculations have been done by using the strong-collision model through a dynamic molecular simulation. In our model, the diffusing particle is subjected to well-separated strong collisions with frequency ν. After each collision the particle velocity is suddenly thermalized, and extracted from a Maxwell–Boltzmann distribution at the given temperature *T*. Our numerical calculations show that in the limit of high collision frequencies, the diffusion process in our model potential becomes mostly occurred by single jumps; which can be quickly reached as well as the normalized coupling term of substrate potential increases. Moreover, long jumps are occurring along straight lines because the path connecting adjoining adsorption sites coincide with the direction of easy crossing at the saddle point. On the other hand, these studies show that an anomalous dependence of the diffusion coefficient *D* on collision frequency ν holds in the limit of low values of ν. All calculations presented here are performed in the jump-diffusion regime.

Keywords: *Surface diffusion, Adatom, Triangular potential, Molecular dynamic simulation, BGK*

PB100
Dielectric studies on nanocomposites of rubber with whiskers cellulose.

A. LADHAR[a*], M. AROUS[a], H. KADDAMI[b], M. P. F. GRAÇA[c], M. RAIHANE[b],
L. C. COSTA[c], M. LAHCINI[b], A. KALLEL[a]

[a] LaMaCoP, Faculty of Sciences of Sfax, University of Sfax, BP 802-3018 Sfax, Tunísia

[b] Laboratory of Organometallic and Macromolecular Chemistry-Composites Materials, Faculty of Sciences and Technologies, Cadi-Ayyad University, 40000 Marrakech, Morocco

[c] I3N and Physics Department, University of Aveiro, Aveiro, Portugal

The field of nanoscience and nanotechnology is extending the applications of physics, chemistry, biology, engineering and technology into previously unapproached infinitesimal length scales. The polymer-nanoparticles / nanocomposites have been the exponentially growing field of research for developing the materials in last few decades and have been mainly focusing on the structure-property relationships and their development. Since the polymer-nanocomposites have been the staple of modern polymer industry, their durability under various environmental conditions and degradability after their service life are also essential fields of research. Thus, this article is intended to study the dielectric behaviour of natural rubber (NR) based nanocomposites. Dielectric relaxation spectroscopy technique was employed to study the different polarization phenomenon in natural rubber (NR) filled with different amounts of cellulose whiskers. The experimental dielectric data were analyzed within the formalisms of complex permittivity and electric modulus. Dielectric relaxation spectroscopy (DRS) revealed α relaxation processes, water polarization relaxation and interfacial polarization. The α relaxation, correlated with the mobility of NR polymer chains, was influenced by the interaction between cellulose whiskers and natural rubber. The amount of cellulose whiskers did not significantly influence the temperature of the α relaxation (correlated with glass transition). Above T_g, a relaxation process associated to the presence of traces of water in cellulose was observed. The spectra exhibit, also, conductivity phenomena at low frequencies and high

temperatures related to ionic species in the nanocomposites. It gives rise also to the interfacial polarization and both real and imaginary parts of ε strongly increase. The activation energy and the relaxation strength were influenced by filler content.

PB101

Dielectric properties of PLZT electocaloric ceramics prepared by the sol gel method

B. ASBANI[1,2], M. AMJOUD[1,] D. MEZZANE[1], M. EL MARSSI[2] ,Y.GAGOU[2] , J.L. DELLIS[2], A. LAHMAR[2], A. BELBOUKHARI[1]

[1]Laboratoire de Matière Condensée et Nanostructures (LMCN) - Université Cadi Ayyad, Marrakech Maroc

[2]Laboratoire de Physique de la Matière Condensée (LPMC)- université de Picardie Jules Vernes, Amiens France

PLZT 9/65/35 ceramics with different calcination temperatures were prepared by sol gel process. Phase structure and dielectric properties were investigated. The dielectric measurements were performed in the frequency range of 100Hz–1MHz from room temperature to 500°C. Typical relaxor behavior, strong dispersion of dielectric permittivity and temperature shift of maximum of dielectric permittivity was observed. We reported the effect of calcination temperature on dielectric properties.

***Keywords**: Dielectric permittivity, Ferroelectrics; Electrocaloric effect , Sol gel, Calcination; Perovskite*

PB102

Dielectric properties of CuO and Cu_2O nanofluids

S. BOUZIT[1,2], M. AIT ALI[1], A. OUTZOURHIT[2]

[1]Laboratoire de Chimie de Coordination et Catalyse (LCCC) - Université Cadi Ayyad, Faculté des Sciences-semlalia Marrakech Maroc

[2]Laboratoire de Physique du Solide et des Couches Minces (LPSCM) - Université Cadi Ayyad, Faculté des Sciences-semlalia Marrakech Maroc

Cuprous oxide (Cu_2O) and copper oxide (CuO) with different morphologies have also been prepared by several routes due to their potential use in various technological areas such as as-catalysis, batteries, solar energy conversion, gas sensing and field emission. In this work, the synthesis of (CuO) and (Cu2O) nanoparticles was prepared by a solution-phase method in the presence of oxidizing agent and sodium hydroxide (NaOH) using either ethylene glycol (EG) or polyethylene glycol (PEG) as a dispersant and growth-directing agent. The morphology of the CuO and Cu2O nanoparticles was investigated by Scanning Electron Microscopy (SEM).

Infrared spectroscopy (IR) and X-ray powder diffractions (XRD) were used to characterize the chemical composition and crystalline structures of these nanostructured materials. Nanofluids were prepared by dispersing controlled amounts of these nanoparticles in ethylene glycol. The dielectric properties of the obtained nanofluids were measured in the frequency range 40 Hz and 100 kHz using a specially designed cell with two stainless steel cylindrical electrodes. The evolution of the dielectric properties of these nanofluids will be presented and discussed.

Keywords: *nanofluids, nanostructured copper oxides, solution-phase, and dielectric properties.*

PB103

Relaxations investigation in $Pb_{0.75}K_{0.5}Nb_2O_6$ new ferroelectric ceramic by impedance and electric modulus formalisms

A. NEQALI[1], A. BELBOUKHARI[1], E. CHOUKRI[1], Y. GAGOU[2], R. ELMOZNINE[3], M. EL MARSSI[2], D. MEZZANE[1], I. LUK'YANCHUK[2]

1 LMCN, F.S.T.G Université Cadi Ayyad Marrakech, Maroc

2 LPMC, Université de Picardie, 33, rue Saint-Leu, 80039 Amiens Cédex, France

3 LPCM, Faculté des Sciences d'Eljadida, Maroc

Using conventional solid state synthesis under air, the sample $Pb_{0.75}K_{0.5}Nb_2O_6$ were prepared in a single-phase TTB structure as indicated from X-ray analysis. Impedance spectroscopy analysis of the dielectric properties of $Pb_{0.75}K_{0.5}Nb_2O_6$ ceramic were investigated in the frequency range, 10Hz–1MHz and in the temperature duration from room temperature to 550°C. Impedance and modulus plots were used as tools to analyze the sample behavior as a function of frequency. Cole–Cole plots showed non-Debye relaxation. The nature of variation of the electrical conductivity, and value of activation energy of different temperature regions, suggest that the conduction process is of mixed-type (i.e., ionic polaronic and space charge generated from the oxygen ion vacancies).

Keywords*: TTB, ferroelectrics; Dielectric; Impedance; Electric modulus*

PB104

Structural, Dielectric and Electrical Resistivity Study of nano-ceramics La doped PFT

LHAJ EL HACHEMI OMARI, SALAHEDDINE SAYOURI

LPTA, Department of Physique, Faculty of Sciences-DM, B.P. 1796, Fez-Atlas, Morocco

SSayouri@gmail.com *and* ***bophysiq@gmail.com***

La-$PbFeTiO_3$ samples have been prepared using sol-gel reaction technique and characterized by X-ray Diffraction, IR, Raman and electrical transport. XRD data suggest pseudo-cubic structure for La doped compositions with space group Pm3m. However, unit cell dimensions are found to decrease with increase in La concentration. Resistivity data have been fitted with the Arrhenius Law. It was observed that the substitution of La in the series leads to an increase in conductivity of the samples with conduction being controlled by the disorder induced localization of charge carries.

Keywords: *$PbLaTiO_3$; Perovskite structure; Resistivity; Sol-Gel method; Iron; Relaxation; Ceramics.*

PB105

ELABORATION, CARACTERISATION ET PROPRIETES OPTIQUES DES COUCHES MINCES D'OXYDE DE ZINC DOPEES NEODYME PAR SPRAY COATING

Mehdi HSSEIN, N. CHOUKRI, M. El JOUAD, Z. SOFIANI et M. ADDOU

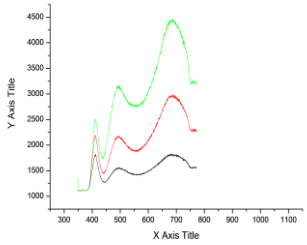
Laboratoire Optoélectronique et Physico-chimie des Matériaux. Unité de recherche associée au CNRST-URAC-14. Université Ibn Tofail, Faculté des Sciences BP 133 Kenitra 14000, Morocco

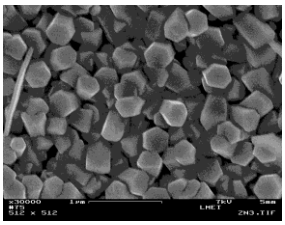
hss.mehdi@gmail.com

L'oxyde de zinc est un matériau faisant partie de la famille des oxydes transparents conducteurs. La non-toxicité et l'abondance sur la terre de ses composants font de lui un candidat idéal utilisé comme contact électrique transparent pour les cellules solaires en couches minces [1]. Ce matériau est d'une grande importance dans le domaine de l'optoélectronique et du photovoltaïque [2]. Lorsque le ZnO est dopé aux ions de terre rare, il permet à la fois une absorption de photons d'énergie supérieure au gap et un transfert très efficace d'énergie vers les ions terres rares (Nd, Yb, Eu, Er…), qui émettent dans le visible ou le rouge [3]. Il peut être utilisé dans plusieurs applications entrant dans différents domaines scientifiques et industriels tels que les transducteurs piézoélectriques, guides d'onde, détecteurs de gaz, électrodes transparents conducteurs.

L'objectif de notre travail porte sur la préparation des couches minces de ZnO dopées néodyme par spray coating. La microstructure et la morphologie de ces couches minces ont été étudiées par la microscopie électronique à balayage (MEB). Ainsi qu'une étude de la photoluminescence de ces couches minces, a été réalisée.

Mots-clés : *ZnO, couche mince, néodyme, MEB, photoluminescence.*





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PB106

Electrical characterization of n-ZnO/p-Cu_2O hetero-junctions

L. NKHAILI[1], A. OUTZOURHIT[1], M. ELYAAGOUBI[1], A. ELMANSOURI[1], A. EL KISSANI[1], M. AIT ALI[2]

[1]Solid State Physics and Thin Films Laboratory, Faculty of Sciences Semlalia, Cadi Ayyad University, PO Box: 2390, Marrakech 40000, Morocco

[2]Laboratory of coordination chemistry and catalysis, Faculty of Sciences Semlalia, Cadi Ayyad University, PO Box: 2390, Marrakech 40000, Morocco

aoutzour@uca.ma

In this work, n-ZnO/p-Cu_2O hetero-junctions were fabricated by RF-sputtering on ITO covered glass substrates. The structural and optical properties of the respective films were analyzed by X-ray diffraction and UV-VIS spectroscopy. The electrical properties were investigated by current-voltage (I-V) and impedance measurements. Junction capacitance and conductance versus applied DC voltage and frequency (C-V, C-f, G-V, G-f) were performed at room temperature on these devices in the dark. The C-f characteristics (Figure 1) were modeled in order to better understand the electrical properties of these

hetero-junctions. The various results of these investigations are presented and discussed. Measurement performed under illumination will also be presented and discussed.

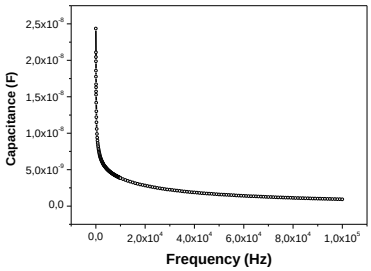

Figure 1. Capacitance- frequency characteristics of the ITO/ZnO/Cu2O/Al device

Keywords: Hetero-junctions, CuO, ZnO, thin films, capacitance, conductance, current-voltage characteristics

PB107

Electrical, optical and structural properties of nanocomposites based on oxide metals and extracts of local plants.

L. NKHAILI1, A. ELKISSANI[1], , M. ELYAAGOUBI[1], A. ELMANSOURI[1], A. OUTZOURHIT[1], M. AIT ALI[2], A. OUERIAGLI[1]

[1]Solid State Physics and Thin Films Laboratory, Department of Physics, Faculty of Sciences
Semlalia, Cadi Ayyad University, Marrakech – Morocco
[2]Coordination Chemistry Laboratory, Department of Chemistry, Faculty of Sciences Semlalia, Marrakech Morocco
aoutzour@uca.ma

In this work, various nano-composites based on metal oxide nano-particles and extracts from local plants were fabricated. The nano-composites were fabricated by mixing nano-structured ZnO, or CuO powders with the extracts of local plants. Thin films of these nano-composites were then deposited by spin coating either on glass substrates, or on glass substrates coated with conducting electrodes. The optical transmittance of different samples was measured in the 250 -2200 nm wavelength range. Structural and micro structural

properties were investigated by x-ray diffraction scanning electron microscopy.
Electrical properties of these nano-composites are studied as a function of composition and frequency from 100 Hz to 100 kHz by measuring the capacitance and conductance measurements. .The results of these measurements will be presented and discussed.

PB108
Electrical properties of Cu_2ZnSnS_4/ZnO heterostructures

A.EL KISSANI[1], L. NKHAILI[1], A. ELMANSOURI[1], M.ELYAAGOUBI[1], A. OUTZOURHIT[1],K.ELASSALI[1]

[1]Solid State Physics and Thin Films Laboratory, Faculty of Sciences Semlalia, Cadi Ayyad University, PO Box: 2390, Marrakech 40000, Morocco

In this work, ZnO and Cu2ZnSnS4 (CZTS) thin films were deposited on ITO substrates respectively by electrochemical technique and by spin coating from a sol-gel precursor of CZTS. The morphological and optical properties of the CZTS and ZnO thin films have been studied using scanning electron microscopy (SEM) and UV-VIS spectroscopy respectively. The electrical junction properties Cu2ZnSnS4/ZnO were characterized by current-voltage (I-V) measurements. Additionally, both capacitance and conductance versus applied DC voltage and frequency (C-V, C-F, G-V and G-F) measurements were realized at room temperature and at high frequency. The effect of the annealing in an argon atmosphere was also discussed the various results are proposed and discussed.

Key words: *Cu2ZnSnS4; ZnO; spin-coating; electrodeposition; UV-VIS; SEM; courant-voltage (I-V).*

List of Participants

Ref.	Name	First name	Country
CONF09	ABOU-DAKKA	MAHMOUD	Canada
PB58	ABOUELAOUALIM	DRISS	Morocco
PB68	ACHOUR	HAFIDA	Algeria
OC3	ADHIKARI	HITESH	Nepal
OA28-A39-PB82-PB83	ACHOUR	MOHAMMED ESSAID	Morocco
OA37	AFQIR	MOHAMED	Morocco
PB11	AIT ABDELKADER	SIDI ABDELMAJID	Morocco
PB102-PB106-PB107	AIT ALI	M.	Morocco
PB17	ALLAMA	FOUZIA	Algeria
PA51	ALONTSEVA	DARYA	Kazakhstan
PA70	AMEUR	KHEIRA	Algeria
PA31	AMIRAT	SAMIA	Algeria
PB101	AMJOUD	M.	Morocco
PB64	ARAB	ALI ZINE EL ABIDINE	Algeria
PA78	ARAR	OUIZA	Algeria
PB82	ARIBOU	NAJOIA	Morocco
PB71	ARJDAL	EL HANAFI	Morocco
OB14- PB100	AROUS	MOURAD	Tunisia
PB101	ASBANI	A.	Morocco
OB31	ASKRI	BASMA	Tunisia

OA06- PA30	ASSAID	EL MAHDI	Morocco
PB108	ELASSALI	K.	Morocco
OB22-PB22- PA99	ATANGANA	JACQUES	Cameroon
PA97	AYADI	KHALED.	Algeria
PB29	AZOUGGAGH	MOHAMMED	Morocco
PB72	BALTACH	ABDELGHANI	Algerie
PA55	BARHOUMI	AMIRA	Tunisia
PB42	BEKHEMAS	K.	Algeria
OA39	BELATTAR	JILALI	Morocco
PB101- PB103	BELBOUKHARI	A.	Morocco
OA38	BELDJILALI	ABDESLEM	Algeria
PA33	BELKAHLA	SOLIMAN	Algeria
PA50- PB7	BELLIFA	ABDERRAHIM	Algeria
OB21-PA006- PB1	BELOUADAH	RABAH	Algeria
OA14	BEN AMOR	MOHAMED	Tunisia
PA002	BEN RHAIEM	ABDALLAH	Tunisia
PA56	BENAISSA	MAHFOUD	Algeria
OB33	BENAMI	ABDELLAH	Morocco
PA87	BENAMMAR	ABDESSALEM	Algeria
OB15	BENCHAABANE	AIDA	France
PA42	BENCHENANE-MEHOR	HALIMA	Algeria
PA11	BENCHERIF	KADDOUR	Algeria

PA88	BENCHIHEUB	MOSTEPHA	Algeria
PB62	BENDJEBBOUR	MOHAMMED	Algeria
PB35	BENHOURIA	YOUNES	Morocco
OB01	BENOTSMANE	AHMED	Algeria
OA18- PA73	BENREKAA	NASSER	Algeria
PA83	BENSEDDIK	NADIA	Algeria
PA20	BENSLIMANE	MERIEM	Algeria
PA005	BENTAYEB	KAMEL	Algeria
PB81	BENTAYEBI	M.E.	Morocco
OB37	BESSISSA	LAKHDAR	Algeria
OB19-PA14	BGHOUR	MUSTAPHA	Morocco
PB96	BOUAJAJ	A.	Morocco
PA91	BOUCHEAGHEM	FOUZIA	Agleria
PA105	BOUCHENAK KHELLADI	NESRINE	Algeria
PB36	BOUDRAA	SALIHA	Algeria
PA68	BOUGUIMA	SOUHILA	Algeria
PA92	BOUHADJAR	FADILA	Agleria
OB02	BOUHAFS	BENAMAR	Algeria
PB91	BOUHOU	SAMIRA	Morocco
PB59	BOUKEZZI	LARBI	Algeria
OA32	BOUKHRIS	IMED	Tunisia
PB70	BOULFAF	NAIMA	Morocco

OA04- PB2	BOUMOUS	SAMIRA	Algeria
PA22	BOUMOUS	Z,	Algeria
PB12	BOURBIA	AMEL	Algeria
PB87	BOUSSELAMTI	MERIEM	Morocco
PB95	BOUSSOUF	NOURA	Algéria
PB30	BOUYEGH	SAIDA	Algeria
PA69	BOUZIANE	MERYEM	Morocco
PA58	BOUZINA	LILA	Algeria
PB102	BOUZIT,	S.	Morocco
PA52	BRICHNI	ABDERRAZEK	Algeria
CONF01-OA39-PB82	BROSSEAU	CHRISTIAN	France
CONF02- CONF11	BUKA	AGNES	Hungary
PA84	CHAARI	MARIEM	Tunisia
PB48	CHABBOU	ZINEB	Morocco
PB63	CHAIB	MOHAMED	Algeria
PA32	CHAKI	IMANE	Morocco
PA18	CHEBLI	ABDELHAK	Algeria
PB21	CHERBAL	NADJIA	Algeria
OB05	CHITROUB	MOHAMED	Algeria
PA88	CHOUF	SAÏDA	Algeria
PA90	CHOUIKHI	SLIM	Tunisia
PB103	CHOUKRI	E.	Morocco

OA27	CHOURTI	KARIM	Morocco
PB66	CHTOUKI	TAREK	Morocco
CONF03-OA1-OA28-PA39-B5-PB83-PB100-	COSTA	LUIS	Portugal
PB84	DARSOUNI	ABDERRAZEK	Algeria
PB85	DARSOUNI	LAMIA	Algeria
PB101	DELLIS	J. L.	France
OB17	DERAOUI	ABDESSITIR	Belgium
PA102	DHOUIB	AMINA	Tunisia
OB18	DIB	MOBAREK	Morocco
OB13	DJEMEL	AMOR	Algeria
PA61	DJERFAF	FATIMA	Algeria
PA82	DOUFNOUNE	RACHIDA	Algeria
CONF11	ÉBER	NANDOR	Hungary
OB07	EL AIDOUDI	KAMAR	Morocco
OA29	EL BACHIRI	ABDELHADI	Morocco
OB23	EL BEKRI	TAKWA	Tunisia
OA20	EL FATMI	DAOUDI	Morocco
PB47	EL HASSOUANI	YOUSSEF	Morocco
PB99	EL KORAYCHY	EL YAKOUT	Morocco
PB101- PB103	EL MARSSI	M.	France
PB38	EL MOUSSAOUY	ABDELAZIZ	Morocco

OB25	ELALEM	ABDULATI	Libya
PA67	ELAOUD	ZAKARIA	Tunisia
OA10	ELBASSET	ABDELHALIM	Morocco
OB16	ELBIYAALI	ABDERRAHIM	Morocco
PB82	ELBOUAZZAOUI	SAAHEDDINE	Morocco
PA37	ELFAKIR	AMINA	Morocco
PB83	ELHAD KASSIM	SAÏD A. B.	Morocco
OA28	ELHASNAOUI	MOHAMED	Morocco
PB106 -PB107-108	ELKISSANI	A.	Morroco
PB106-PB107-108	ELMANSOURI	A.	Morocco
PB76	ELMOUSSAOUI	H.	Morocco
PB103	ELMOZNINE	R.	Morocco
PB31	ELSAFI	BASSEM	Tunisia
OA16	EL-TANTAWY	FARID	Egypt
PB78	ENNAJHI	YOUSSEF	Maroc
PB106 PB107	ELYAAGOUBI	M .	Morocco
OC7	ERSOY	AYSEL	Turkey
PB34	ESSAOUDI	ISMAIL	Morocco
OB32	EYADEH	ALI	Saudi Arabia
OB12- PA64	FAKHFAKH	SLIM	Tunisia
PB26	FARHI	HAYET	Algeria
OA15	FATTOUM	ARBI	Tunisia

PA103	FELLAOUI	KHALID	Morocco
PB56	FENICHE	ALI	Morocco
OB08-PA48	FERAOUN	ABDELLAH	Morocco
OB36	FERGANI	FATIMA	Morocco
CONF10- CONF05	FONTANELLA	JOHN	USA
CONF06	FORRO	LASZLO	Switzerland
PA93	FRĄCZEK	ZIEMOWIT	Poland
OC2	FRECHERO	MARISA ALEJANDRA	Argentina
PA46	GACEM	LAKHDAR	Algeria
PB101- PB103	GAGOU	Y.	France
PB20	GALADI	ABDELGHAFOUR	Morocco
OA12	GARGOURI	MOHAMED	Tunisia
PA71	GHANEMI	SOUMIA	Algeria
PA75	GHARZOULI	NORA	Algeria
PA49- PB6	GHELAMALLAH	MADANI	Algeria
PA53	GHELLAI	NASSERA	Algeria
PB92	GHERRAS	HAMMOU	Algeria
PB93	GHILLAL	Y.	Algeria
OA11	GHONEIM	AHMED	Egypt
PA80	GHORBEL	NOUHA	Tunisia
PB100	GRAÇA	M. P. F.	Portugal
OA08	GUEDDIM	AHMED	Algeria

PB25	GUERBAS	FETTOUMA	Algeria
PA003	GUIDARA	KAMEL	Tunisia
PA28	GULLU	OMER	Turkey
PA12	HADDAD	BOUMEDIENE	Algeria
PA25	HADDAD	HOUARI	Algeria
PA76	HADDAD	AMMAR	Algeria
PB51	HADDOUCHE	ALI	Algeria
PB43	HADJADJ	MEROUANE	Algerie
PB15	HADJOUB	ILHEM	Algeria
OA30	HADRI	ADIL	Morocco
PA54- PB60	HAFID	ABDELHALIM	Morocco
PA23	HALIMI	MOKHTAR	Algeria
PA47- PA34	HAMAIDI	BRAHIM	Algeria
PA16	HAMDADOU	NASR-EDDINE	Algeria
PA98	HAMICI	MELIA	Algeria
PB9	HAMOUDI	DJAMEL EDDINE	Algeria
PA101- PA95- PB44	HAMOUNI	MOHAMMED	Algérie
CONF04	HAMRAOUI	AHMED	France
OB20- PB10	HAMZAH	MOHAMMED	Morocco
PB54	HANDALA	MOHAND AMOKRANE	Algeria
PA38	HASANLI	NIZAMI	Turkey
PA96- PB88	HEMINE	JAMAL	Morocco

PB74	HOCINI	ABDERRAOUF	Algeria
PB27	HOLDERNA-NATKANIEC	KRYSTYNA	Poland
PB 105	HSSEIN	MEHDI	Morocco
OA13	IBRAL	ASMAA	Morocco
PB73	IKHLEF	SAMAH	Algeria
PB86	JADOUAL	LAMIAE	Morocco
PB61	JDAA	RACHID	Morocco
OB34- PB77	JOMNI	FATHI	Tunisia
PB100	KADDAMI	H.	Morocco
PA62	KADDOUR	CHARAZED	Algeria
OA35	KADI	HOCINE	Algeria
PB86	KADDOURI	ABDELILAH	Morroco
PB80	KAGHOUCHE	BESSEM	Algeria
PA59- PB8	KAHLOUL	LATIFA	Algeria
PB100	KALLEL	ALI	Tunisia
OA09	KARRAY	MAYSSA	Tunisia
PB39	KEFIF	KHEIRA	Algeria
OC5	KENFACK SADEM	CHRISTIAN	Cameroon
OA07	KHACHANE	MANAR	Morroco
PB77	KHALDI	OTHMEN	Tunisia
PA41	KHALFA	MOHAMED	Algeria
OA33	KHARROUBI	MOHAMED	Algeria

PA79	KHELIFI	RESKI	Algeria
PA008	KHERIS	SALIHA	Algeria
PA15- PB4	KIDARI	RACHID	Morocco
OB35	KIROU	HASSAN	Morocco
OB04	KOANE	JEAN-NOËL	C.African Republic
OC1	KREMER	FRIEDRICH	Germany
PA40	KRIBAA	OUM KELTOUM	Algeria
OC4	KUMBHARKHANE	ASHOK	India
OB03	KUSOGLU SARIKAYA	CEMRE	Turkey
PB100	LADHAR	ALA	Tunisia
OC6	LAGHA	HAJER	Tunisia
PB28	LAGHRIB	SOUAD	Algeria
PB100	LAHCINI	M.	Morocco
PB83	LAHJOMRI	FOUAD	Morocco
PB101	LAHMAR	A.	France
PB33	LATRECHE	LEILA	Algeria
PB19	ŁAWNICZAK	PAWEL	Poland
PA36	LEMMOUI	ABDENNACER	Algeria
PA24	LIMOUNY	LHOUSSINE	Morocco
PB53	LOUARDI	AHMED	Morocco
PB49	LOUDJANI	NADIA	Algeria

PB65	LOUHIBI	SOUAD	Algeria
PB103	LUK'YANCHUK	I.	France
PB98	M. M. AL-HINDAWEY	SOMAYA	Egypt
PB78-BP79	MABROUKI	MUSTAPHA	Morocco
PA100- PB37	MAGOUSSI	HOUDA	Morocco
PB14	MAIZ HADJ AHMED	HAMZA	Algeria
PA45	MANSAR	NADJIB	Algeria
PA44	MANSOUR	MAHDI	Algeria
PA85	MATOUSSI	ADEL	Tunisia
PA94	MAZARI	HALIMA	Agleria
PA60	MEDDAH	SOUMAYA	Algeria
PA13- PB3	MEDLES	KARIM	Algeria
PB94	MEKKAOUI	HOURIA	Algeria
PB52	MERADJI	HOCINE	Algeria
PA004	MERZOUKI	ABDELHAFID	Algeria
PA63	MERZOUKI	ABDELAZIZ	Algeria
PA43	MESSAOUDI	ILHEM SOUAD	Algeria
PB101- PB103	MEZZANE	D.	Morocco
OA19	MHADHBI	MOHSEN	Tunisia
PA17	MILOUDI	MOHAMED	Algeria
OA17	MOHAMED BEN ALI	AMEL	Algeria

PB32	MOKHTARI	BOUCHRA	Morocco
PB46	MOSTEFA KARA	SELMA	Algeria
OA34	MOUALKIA	HASSIBA	Algeria
OB24	MOUSA	ALI	Iraq
PB40	MOUSSAOUI	AHMED.	Morocco
PA009	MOUTATAOUIA	MERYEM	Morocco
OA26	MRHARRAB	LAMIAE	Morocco
PA72	MSOUNI	HOUDA	Morocco
PA19	NARJIS	ABDELFATTAH	Morocco
PA51	NASSAR	IBRAHIM	Egypt
PB75	NASSIRI	CHOUROUK	Morocco
OB11- PB23	NEBBACHE	NADIA	Algeria
PB106-PB107-108	NKHAILI	L.	Morocco
PA81	NEKKAA	SORYA	Algeria
PB103	NEQALI	A.	Morocco
OB28	NINIS	OUAFAE	Morocco
PA007	NOUACER	SANA	Algeria
OA21	OLATINSU	OLAWALE	Nigeria
PB104	OMARI	LHAJ EL HACHEMI	Morocco
PB50	OUACHTARI	FOUAD	Morocco
PB41	OUCHANI	NOAMA	Morocco
PA010	OUENDADJI	SALIMA	Algeria

PA77	OUERFELL	NAJOUA	Tunisia
PA103-PB56-PB79-PB107	OUERIAGLI	AMANE	Morocco
PA35	OUIDDIR	RABAH	Algeria
PB79	OUTIZI	MUSTAPHA	Maroc
O1A–OA7-OA37-PA72-PA103-PB56-PB102-PB106-PB107-PB108	OUTZOURHIT	A.	Morocco
PA66	PETKOV	PLAMEN	Bulgaria
OA22-PA66	PETKOVA	TAMARA	Bulgaria
OA31	PINTILIE	LUCIAN	Romania
CONF08- PB18	PISSIS	POLYCARPOS	Greece
PB67	RABEHI	ABDELAZIZ	Algeria
OA25	RAHMOUN	KHADIDJA	Algeria
PB105	RAHMOUNI	HEDI	Tunisia
OB09	RAIDOU	ABDERRAHIM	Morocco
PB100	RAIHANE	M.	Morocco
PB89	REBIAI	SAIDA	Algeria
OB30	REJAIBA	OMAR	Tunisia
CONF12	REMIENS	DENIS	France
OB06- PA65	REMRAM	MOHAMED	Algeria
PA86	REZZAG	HADDA	Algeria
PB55	RIZQI	NAIMA	Morocco

PA89	RMILI	AHMED	Morocco
OA05	ROUHA	NACERA	Algeria
CONF07	SAHRAOUI	BOUCHTA	France
OB26	SAID	KAMEL	Tunisia
PA001	SAOUDI	AMER	Algeria
PB69	SASSANE	NACIRA	Algeria
PA104	SAYAH	BILAL	Agleria
PB45	SAYAH	CHOUKRIA	Algeria
PB104	SAYOURI	SALAHEDDINE	Morocco
PB16	SEGHIER	TAHAR	Algérie
PB57	SEKKAL	ABDESSAMAD	Algeria
OA36	SELLAK	RADOUANE	France
PA27	SLAMA	MOHAMMED EL AMINE	Algeria
PA26	SOLTANI	HOUARI	Algeria
OA01	TACHAFINE	AMINA	France
OB10	TALEB	IHSENE YASSER	Algeria
OB29	TALHA	LAMIAE	Morocco
PA74	TOUIL	M'HAMED	Morocco
OA03	TRIKI	ASMA	Tunisia
PB24	TRIKI	HOURIA	Algérie
OA02	TURKY	GAMAL	Egypt
PB18	VARTZELLIS-	KALLIOPI	Greece

	NIKAKIS		
CONF05-CONF10	WINTERSGILL	MARY	USA
PA57	YURTSEVEN	HAMIT	Turkey
PB97	ZAHAF	FAIZA	Algeria
PA84	ZAIM	NOURA	Morocco
OB27- PB13	ZAYANI	JAAFAR OTHMAN	Tunisia
OA23	ZDANOWSKA-FRĄCZEK	MARIA	Poland
PB90	ZIARI	ZEHIRA	Algeria
PA21	ZIDANI	MOSBAH	Algeria
PA29	ZOUBIR	AZIZ	Algeria
OA24	ZOUITINE	ASMA	Morocco