



3RD BRAZIL MRS MEETING

October 10-13, 2004

S Y M P O S I U M A :

Nanostructured Materials: Synthesis,
Characterization And Theory

Symposium Organizers:

Edson Roberto Leite (DQ / UFSCar)

Gerardo Goya (IF-USP/SP)

Jose Antonio Brum (LNLS)

Oswaldo L. Alves (IQ/UNICAMP)

Oscar Loureiro Malta (DQ/UFPE)

SYMPOSIUM A

NANOSTRUCTURED MATERIALS: SYNTHESIS, CHARACTERIZATION AND THEORY

Monday, October 11

- Session Chair: Edson Roberto Leite (UFSCar)
- 08:00 Invited NEW DIRECTIONS IN CARBON NANOTUBE SCIENCE:
CONTROLLED SYNTHESIS, ELECTRONIC PROPERTIES AND NOVEL
DEVICES USING B- AND N-DOPED SYSTEMS
M. Terrones - Advanced Materials Department, IPICyT, México (A-I01)
- 08:45 CONTROLLED SYNTHESIS OF ISOLATED SUSPENDED SINGLE
WALL CARBON NANOTUBES BY CHEMICAL VAPOR DEPOSITION
A. S. Ferlauto, F. Plentz, C. Fantini, M. A. Pimenta, L. O. Ladeira – UFMG; J.
D. Ardisson - CDTN – CNEN (A-O28)
- 09:00 SYNTHESIS OF ITO NANORIBBONS WITH DIFFERENT Sn:In RATIOS
M. O. Orlandi, E. R. Leite, E. Longo - UFSCar (A-O19)
- 09:15 CRYSTAL GROWTH IN COLLOIDAL NANOCRYSTALS:
COALESCENCE OR COARSENING
E.R. Leite, UFSCar (A-O23)
- 09:30 STABILITY OF NANOWIRES IN InAs/InGaAs/InP STRUCTURES
L. Nieto, J.R.R. Bortoleto - UNICAMP – IFGW; H.R. Gutiérrez - Penn State
University, USA; R.M. Paniago - UFMG (A-O24)
- 09:45 STRAINED InP NANOWIRES
J. C. González, E. Ribeiro, F. M. Matinaga, M. I. N. da Silva - UFMG; X. J.
Sanchez, D. Zanchet, D. Ugarte - LNLS; H. R. Gutierrez - PSU; M. A. Cotta -
UNICAMP (A-O25)
- 10:00 ATOMIC SIZE NANOWIRES FROM METALLIC ALLOYS
D. S. Galvão, F. Sato, D. Ugarte - UNICAMP; A.S. Moreira, P. Z. Coura, S.
O. Dantas - UFJF; J. Bettini, P. C. Silva - LNLS; S. B. Legoas - UFAM
(A-O07)
- 10:15 COFFEE-BREAK

- Session Chair: Oscar Loureiro Malta (UFPE)
- 10:30 Invited CONTROLLING NANOPARTICLE PROPERTIES BY COLLOIDAL METHODS
D. Zanchet, J.M. Vargas, T.C.R. Rocha – LNLS; M. Knobel - UNICAMP (A-I02)
- 11:15 TAILORING THE SIZE AND SHAPE OF NOBLE METAL COLLOIDAL NANOPARTICLES
T. C. R. Rocha, D. Zanchet - LNLS/UNICAMP (A-O06)
- 11:30 SiO₂/PbTe QUANTUM DOT OPTICAL SWITCH
L. C. Barbosa, E. Rodríguez, E. Jimenez, G. J. Jacob, A. A. R. Neves, C. L. César, M.A. Cotta - UNICAMP (A-O22).
- 11:45 ELECTROCHEMICALLY GROWTH OF ALUMINA WITH POLYGONAL POROUS SHAPE
M. L. Cardoso, A. J. A. de Oliveira, E. C. Pereira - UFSCar (A-O29).
- 12:00 LOW TEMPERATURE SYNTHESIS OF PEROVSKITE LEAD TITANATE NANOPARTICLES BY OPM-HYDROTHERMAL METHOD
C. M. Barrado, E. R. Camargo, E.Longo, E. R. Leite - UFSCar (A-O17).
- 12:15 THE DEVELOPMENT OF SPRAY-PYROLYSIS FOR THE PREPARATION OF LUMINESCENT SUB-MICRONIC POWDERS
J. Dexpert-Ghys, M. Verelst, Y. Kihn, L. Bucataru - CEMES-CNRS-France; N. Joffin - DGTec-SAS-France (A-O18)
- 12:30 LUNCH
- Session Chair: Oswaldo L. Alves (UNICAMP)
- 14:00 Invited RAMAN SPECTROSCOPY FOR STUDYING NANOSTRUCTURED MATERIALS
A. G. Souza Filho, J. Mendes Filho – UFC; O. P. Ferreira, I. O. Mazali, O. L. Alves – UNICAMP; S. B. Fagan - UNIFRA-RS; M. S. Dresselhaus - MIT-USA (A – I03)
- 14:45 TiO₂ NANOCRYSTALS INTO A POROUS VYCOR GLASS: ACHIEVING THE COALESCENCE CONTROL
I. O. Mazali, O. L. Alves - IQ – UNICAMP - LQES; A. G. S. Filho, J. M. Junior – UFC (A-O13)
- 15:00 CARBON DOPED NANOPOROUS ALUMINUM OXIDE: A NEW NANOSTRUCTURED MATERIAL FOR IONIZING RADIATION DOSIMETRY
W. M. de Azevedo, E. F. da Silva Jr, H. J. Khoury - UFPE (A-O26)

- 15:15 CdS/TiO₂ NANOCOMPOSITE: RAMAN SPECTROSCOPY AND PHOTOCATALYTIC ACTIVITY
M.T.C. Sansiviero, J. Tristão, F. Magalhães - DQ/ICEx/UFMG; P. Cório - IQ/USP; V. C. Costa - CDTN (A-O15)
- 15:30 PHOTOLUMINESCENCE FROM NOVEL GOLD-(CONDUCTING POLYMERS) NANOCOMPOSITES
C. G. dos Santos, J.D. Ribeiro-Filho, C.P. de Melo - UFPE (A-O16)
- 15:45 EXFOLIATION AND GRAFTING OF SILANES IN LAYERED MATERIALS: A NEW STRATEGY TO PRODUCE POLYMER NANOCOMPOSITES WITH OPTIMIZED MECHANICAL PROPERTIES
F. Wypych, K.G. Satyanarayana - UFPR (A-O12)
- 16:00 CHARACTERIZATION OF POLYPROPYLENE/LAYERED SILICATES NANOCOMPOSITES USING TEM
T. P. R. Cristina, M. A. J. Augusto - DEMa- UFSCar; C. Giovanni - UNITO; G. Walter - CDCMP-UNITO; F. Giuseppe, P. Gianpaolo - Basell (A-O14)
- 16:15 COFFEE-BREAK
- 16:20 POSTER SESSION

Tuesday, October 12

- Session Chair: José Antonio Brum (LNLS)
- 08:00 Invited METAL-SEMICONDUCTING BEHAVIOR OF CARBON NANOTUBES ADSORBED ON HYDROGENATED Si(100) SURFACES
R.H. Miwa, W. Orellana – UFU; A. Fazzio – USP (A-I04)
- 08:45 THEORETICAL INVESTIGATION OF IRON DIMERS AND TRIMERS INTERACTING WITH CARBON NANOTUBES
S. B. Fagan - UNIFRA; R. Mota - UFSP; A. J. R. da Silva, A. Fazzio - USP (A-O41)
- 09:00 FUNCTIONALIZATION OF CARBON NANOTUBES THROUGH CARBOXYLIC GROUPS
S. B. Fagan - UNIFRA; M. V. Veloso, A. G. Souza Filho, J. Mendes Filho - UFC (A-O43).
- 09:15 SINGLE ELECTRON DEVICES ON NANOCRYSTALLINE SILICON
R. Martins, L. Raniero, I. Ferreira, E. Fortunato - Uninova, Campus FCT, Portugal (A-O39)

- 09:30 A THEORETICAL AND EXPERIMENTAL APPROACH TO COLLOIDAL CdS NANOPARTICLES
P. M. A. de Farias, B. S. Santos, R. Ferreira, R. L. Longo - UFPE; Carlos L. César - UNICAMP (A-O38)
- 09:45 A MOLECULAR DYNAMICS STUDY OF LIQUID AND AMORPHOUS ZnTe
D.S.Borges, J.P.Rino - UFSCar, CMM(AM) (A-O40).
- 10:00 COFFEE-BREAK
- Session Chair: Gerardo Goya (IF-USP)
- 10:30 Invited EFFECTS OF DIPOLAR INTERACTIONS ON MAGNETIC PROPERTIES OF GRANULAR SOLIDS
M. Knobel, L. M. Socolovsky, A.L. Brandl, W.C. Nunes – UNICAMP; J.M. Vargas, D. Zanchet – LNLS (A-I05)
- 11:15 MAGNETIC FEATURES OF Fe SMALL PARTICLES SUPPORTED IN Ag AND Cd FILMS
E. B. Saitovitch, P.E. Munayco, D. Sanchez, H. Micklitz, M. Ghafari - CBPF (A-O08)
- 11:30 DEPTH DEPENDENCE OF THE LOCAL STRUCTURE IN MAGNETIC THIN FILMS WITH PERPENDICULAR ANISOTROPY
N. M. S. Neto, A. Y. Ramos, H. C. N. Tolentino, A. D. Santos, A. Martins - LNLS & IF-USP (A-O09)
- 11:45 INFLUENCE OF THE INTERPARTICLE INTERACTIONS ON THE ORDERED STATE IN Fe₃O₄ NANOPARTICLES
G. F. Goya - IFUSP (A-O10)
- 12:00 PREPARATION OF ELECTRODEPOSITED Co NANOWIRES
V. R. Caffarena, A. P. G. Filho - CBPF; R. A. Simão, J. L.Capitaneo - PEMM-COPPE (A-O11)
- 12:15 LUNCH

Wednesday, October 13

- Session Chair: Helio C. N. Tolentino (LNLS)
- 08:00 Invited FIELD EMISSION ELECTRON MICROSCOPY IN NANOTECHNOLOGY - NEW DETECTION TECHNIQUES AND FIELDS OF APPLICATIONS
Peter Fruhstorfer - Carl Zeiss NTS GmbH (A-I06)

- 08:45 X-RAY TOOLS TO ANALYZE NANOSTRUCTURES
M.C.A. Fantini - USP (A-O01)
- 09:00 STRUCTURAL AND ELECTRONIC PROPERTIES OF Au-Pt
BIMETALLIC NANOPARTICLES STUDIED BY SYNCHROTRON
RADIATION TECHNIQUES
L. Giovanetti, J. M. Ramallo-López, F. G. Requejo - Dto. Física, FCE, UNLP
e IFLP (CONICET) Argentina; D. García-Gutiérrez, M. J. Yacaman - The
Texas Materials Institute, University of Texas at Austin, USA; A. Craievich – IF-
USP (A-O04)
- 09:15 SCANNING PROBE MICROSCOPY STUDIES OF MAGNETIC HOPG
SAMPLES
M. I. N. da Silva - DF-ICEX–UFMG; M. A. Cotta, Y. Kopelevich -
UNICAMP (A-O03)
- 09:30 MECHANICAL PROPERTIES OF NANOWIRES AND NANOSPRINGS
A. F. da Fonseca, C. P. Malta - IFUSP; D. S. Galvão - IFGW (A-O02)
- 09:45 ELECTRICAL TRANSPORT IN InAs/InP WIRE-DOT ASSEMBLIES
K.O. Vicaro, H.R. Gutierrez, J.R.R. Bortoleto, L. Nieto, A. A. G. von Zuben,
P.A. Schulz, M.A. Cotta - UNICAMP – IFGW; A.C. Seabra - LSI-EPUSP
(A-O21)
- 10:00 IRIDIUM NANOPARTICLES IN IMIDAZOLIUM IONIC LIQUIDS:
SYNTHESIS AND CHARACTERIZATION BY TEM
G. Machado, G. S. Fonseca, J. Dupont, S. R. Teixeira - UFRGS (A-O27)
- 10:15 COFFEE-BREAK
- Session Chair: Israel Baumvol (IF-UFRGS)
- 11:00 ION IMPLANTATION FOR THE FABRICATION OF STRAINED
SILICON ON THIN RELAXED SIGE VIRTUAL SUBSTRATES
D. Buca, B.Holländer, S. Mantl, N. Hueging, M. Luysberg, R. Carius -
Institut für Schicht- und Ionentechnik, ISG 1-IT-Germany; M.J.
Mörschbacher, P.F.P. Fichtner - UFRGS; R. Loo - IMEC, Belgium (A-O33)
- 11:15 CAPACITANCE–VOLTAGE CHARACTERISTICS IN METAL OXIDE
SEMICONDUCTOR STRUCTURE CONTAINING NANOSTRUCTURE
OF SILICON
S. N. M. Mestanza, J. E. C. Queiroz, G. O. Dias, E. S. V. P. Marins, I. Dói, J.
W. Swart, E. Rodriguez, A. L. Gazoto, H. Martinho - UNICAMP (A-O37)

- 11:30 CHEMICAL PROPERTIES AND STABILITY OF ALUMINUM OXYNITRIDE FILMS ON SI UNDER VACUUM AND O₂ ANNEALING
K. P. Bastos, G. V. Soares, L. Miotti, C. Driemeier - UFRGS - Instituto de Física, Laboratório de Superfícies e Interfaces Sólidas; I. J. R. Baumvol - UCS (A-O35)
- 11:45 MANAGING DISORDER IN GaAs/AlGaAs SUPERLATTICES
Y. Pusep - IFSC/USP (A-O32)
- 12:00 ENERGY MODULATED HETEROSTRUCTURES FOR CHARGE TRANSFER AND CONFINEMENT BASED ON CONJUGATED POLYMERS
F. E. G. Guimarães, M. A. Leite, H. R. Favarim, D. Spadacio, V. Zucolotto, O. N. Oliveira Jr. - IFSC/USP (A-O34)
- 12:15 EFFICIENCY IN POLYMER LIGHT EMITTING DIODES
F.E. Karasz - University of Massachusetts, USA (A-O31)
- 12:30 LUNCH
- Session Chair: José Arana Varela (UNESP)
- 14:00 Invited AMORPHOUS, NANOQUASICRYSTALLINE AND NANOCRYSTALLINE HIGH-STRENGTH ALUMINUM BASED ALLOYS.
C.S. Kiminami, J.B. Fogagnolo, C. T. Rios, W.J.Botta Filho, C.Bolfarini – UFSCar (A-I07)
- 14:45 STUDY OF IN SITU ORIENTED CRYSTAL GROWTH IN A CERAMIC NANOSTRUCTURED SYSTEM
C. Ribeiro, E. J. H. Lee, T. R. Giraldi, R. Aguiar, E. Longo, E. R. Leite - LIEC – UFSCar (A-O20)
- 15:00 INFLUENCE OF NANODISPERSOIDS ON HOT MECHANICAL BEHAVIOUR OF DISPERSION-STRENGTHENED COPPER ALLOYS, PREPARED BY REACTION MILLING
R. Espinoza G., R. Palma H., A. Sepúlveda O., C. Ramírez - U. de Chile (A-O30)
- 15:15 MICROSTRUCTURES AND PROPERTIES OF BULK AlFeNd(Cu,Si) ALLOYS, OBTAINED THROUGH CENTRIFUGAL FORCE CASTING
R. A. Mesquita - Villares Metals S.A; D. R. Leiva, W. J. Botta Fo. - DEMa, UFSCar; A. R. Yavari - LPTCM-CNRS, INPG – France (A-O44)

- 15:30 THE ELECTROCATALYTICAL ACTIVITY OF Pt-Rh BILAYER ON THE OXIDATION OF SMALL ORGANIC MOLECULES
M. C. Santos, R. T. S. Oliveira, B. G. Marcussi, L.O. S. Bulhões, E. C. Pereira, P. A. P. Nascente - UFSCAR (A-O45)
- 15:45 METALLIC NANOSTRUCTURE FABRICATION BY AFM LITHOGRAPHY
H. D. Fonseca Filho, C. R. Ponciano, M. H. P. Maurício, R. Prioli - PUC-Rio (A-O46)
- 16:00 COFFEE-BREAK
- 16:20 POSTER SESSION

INVITED PRESENTATIONS

- A-I01 NEW DIRECTIONS IN CARBON NANOTUBE SCIENCE: CONTROLLED SYNTHESIS, ELECTRONIC PROPERTIES AND NOVEL DEVICES USING B- AND N-DOPED SYSTEMS
M. Terrones - Advanced Materials Department, IPICYT, Camino a la Presa San José 2055, 78216 San Luis Potosí, SLP, México

The latest advances in the production and state-of-the art characterization of B- and N-doped carbon nanotubes and nanofibers is discussed. Particular attention will be focused on efficient self-assembly pyrolytic routes to large arrays ($< 2.5 \text{ cm}^2$) of aligned C, CN_x and $\text{B}_x\text{C}_y\text{N}_z$ nanotubes (15-80 nm od and < 100 microns length). In general, these nanofibres do not easily break upon bending and may behave as shock absorbing fillers in the fabrication of robust composites. The electronic properties and the density of states (DOS) of CN_x , BC_x and BCN nanotubes using scanning tunneling spectroscopy (STS) will be presented. Using tight-binding and ab-initio calculations, we demonstrate that the presence of N and B are responsible for introducing donor and acceptor states near the Fermi Level. Novel applications of these doped materials will also be discussed in areas of chemistry (as chemical sensors), biology (as protein immobilizers) and electronics (metallic and semiconducting nanowires). It is clear that these materials possess outstanding properties when compared to pure carbon nanotubes, and it is foreseen that these systems will certainly revolutionize some aspects of nanotube science and technology, thus opening a vast field of experimental and theoretical research.

- I02 **CONTROLLING NANOPARTICLE PROPERTIES BY COLLOIDAL METHODS**
D. Zanchet, J.M. Vargas, T.C.R. Rocha – LNLS, Endereço: Cx. Postal 6192, Campinas-SP; M. Knobel - UNICAMP

The colloidal method has become one of the main choices to produce high quality samples of nanoparticles. The nanoparticles of different materials can be produced in solution and capped by ligands. The synthesis parameters such as temperature and ligand type strongly affect the particle attributes, such as size, shape and crystalline structure and as a consequence, the overall material properties. In the case of iron oxide nanoparticles, the magnetic properties can be tune by temperature and control of oxygen during the synthesis, by affecting the crystallization degree and phase of the formed oxide. In addition, pos-thermal treatment of amorphous-like iron nanoparticles in excess ligand induces particle growth and crystallization. These effects have been studied by High Resolution Transmission Electron Microscopy and X Ray Absorption Spectroscopy and compared to magnetic properties, correlating synthesis conditions and nanoparticle properties. In a similar way, the optical properties of noble metal spherical nanoparticles can be tune by light irradiation, leading to disk-like particles of different sizes. Both cases will be discussed, exemplifying the fine control of particle properties that can be achieved by varying the colloidal synthesis conditions.

- A-I03 **RAMAN SPECTROSCOPY FOR STUDYING NANOSTRUCTURED MATERIALS**
A. G. Souza Filho, J. Mendes Filho – UFC Depto. de Física - UFC, Caixa Postal 6030 Fortaleza, Ceara, Brasil CEP 60455-900; O. P. Ferreira, I. O. Mazali, O. L. Alves – UNICAMP; S. B. Fagan - UNIFRA-RS; M. S. Dresselhaus - MIT-USA

In this talk we will emphasize some recent work we have been done in nanostructured materials by using Raman spectroscopy and how this kind of experiment is used to get information about the structure, phonons and electrons in these low dimensional systems. We focus our discussion on different materials. Firstly we discuss some recent results of Raman spectroscopy in carbon nanotubes. We show how this techniques under strong resonance conditions carries information about both the electronic and atomic structure of carbon nanotubes, thereby making Raman spectroscopy very powerful for a detailed characterization of these materials. Secondly, we discuss Raman scattering results for inorganic nanotubes focusing on vanadate and titanate nanotubes. These nanostructured materials exhibit a different spectral signature when compared with their bulk counterparts and this technique can thus be used for characterizing these materials. Thirdly, we discuss the characteristics of the Raman spectra of TiO₂ nanocrystals supported in porous vycor glass. The analysis of these spectra allowed us to precisely determine the diameter of the nanoparticles, and good agreement with microscope images are obtained. We highlight the role of Raman scattering in characterizing several materials and the opportunities opened up for one to learn about the materials at the nanoscale, and discuss how Raman spectroscopy studies might impact materials science research in the future. (Support:PRODOC-CAPES, IM2C)

- A-I04 METAL-SEMICONDUCTING BEHAVIOR OF CARBON NANOTUBES ADSORBED ON HYDROGENATED Si(100) SURFACES
R.H. Miwa, W. Orellana – UFU; A. Fazio – USP

The direct integration of CNTs into the well-established silicon technology may be an efficient alternative to achieve nanoscale devices and circuits in the near future. Recently, Albrecht and Lyding have demonstrated the feasibility to characterize single-walled CNTs adsorbed on H-passivated silicon surfaces using ultra-high vacuum scanning-tunneling microscopy (UHV-STM) techniques. Following this way, the study of atomistic process occurring at the CNT-surface interface and the effect of the substrate in the electronic properties of the adsorbed CNT, are important questions for the future realization of silicon-based nanoelectronics.

In this work, the adsorption of a metallic single-walled carbon nanotube (CNT) on hydrogenated Si(001) surfaces are studied from first-principles calculation. Our results indicate that the electronic properties of the adsorbed CNT can be ruled by the H concentration along the CNT-H/Si(001) contact region. On the fully hydrogenated Si(001), the CNT is physisorbed, preserving almost unchanged its metallic character. Removing half the H atoms along the adsorption site, we find an enhancement on the metallicity of the adsorbed CNT. In contrast, removing all the H atoms along the adsorption site, the adsorbed CNT becomes semiconducting, exhibiting an energy gap. These results suggest that metallic CNTs adsorbed on H/Si(001) could be transformed into metal-semiconductor junctions by grading the H concentration along the CNT-surface interface.

- A-I05 EFFECTS OF DIPOLAR INTERACTIONS ON MAGNETIC PROPERTIES OF GRANULAR SOLIDS

M. Knobel, L. M. Socolovsky, A.L. Brandl, W.C. Nunes – UNICAMP, Instituto de Física Gleb Wataghin (IFGW), C.P. 6165, Campinas, 13.083-970 SP, Brasil; J.M. Vargas, D. Zanchet – LNLS

The magnetism of ultrafine particles has been studied for more than fifty years, but it is still a field to be better understood. In this talk, a general perspective of recent investigations in granular magnetic systems formed by ultra-fine particles embedded in a non-magnetic matrix will be given. Besides the effect of grain size distribution, which strongly affects the magnetic response of the granular system [1], important factors need to be controlled, such as the surface of the particles (both roughness and composition gradient), the shape, and the phases formed within the nanograins [2]. Another crucial point is the role played by magnetic interactions among the magnetic entities. This subject has been extensively studied from both experimental and theoretical sides [3-5], but until now there is not a clear picture of how the dipole-dipole interactions affect the macroscopic magnetic response of the system. Recent approaches will be shown and compared in order to illustrate the complexity and exhibit some questions that are still unanswered in this fascinating area of magnetism and solid state Physics. [1] E.F. Ferrari, et al., Phys. Rev. B 56, 6086 (1997). [2] C.S.M. Bastos, et al., Phys. Rev. B 66, 214407 (1-8) (2003). [3] S. Morup and E. Tronc, Phys. Rev. Lett. 72, 3278 (1994). [4] J. L. Dormann, et al., Adv. Chem. Phys. 98, 283 (1997). [5] P. Allia, et al., Phys. Rev. B 64, 144420 (2001).

- A-I06 FIELD EMISSION ELECTRON MICROSCOPY IN NANOTECHNOLOGY - NEW DETECTION TECHNIQUES AND FIELDS OF APPLICATIONS

P. Fruhstorfer - Director Sales, Service and Business Development, Carl Zeiss NTS GmbH

A-I07 AMORPHOUS, NANOQUASICRYSTALLINE AND NANOCRYSTALLINE HIGH-STRENGTH ALUMINUM BASED ALLOYS
C.S. Kiminami, J.B. Fogagnolo, C.T. Rios, W.J. Botta Filho, C. Bolfarini – UFSCar, Departamento de Engenharia de Materiais, rod. Washington Luiz, km 235, 13.565-905 São Carlos - SP

In the last decade new aluminum based alloys have been developed which, under special processing routes, nonperiodic structure such as amorphous and icosahedral phases can be formed. These special microstructures lead to tensile strength up to 1.000 MPa (1GPa). In this paper, the state-of-art of the high-strength aluminum based alloys, including our own results are presented. The new composition, which under gas atomization, high energy milling, spray forming and hot extrusion, allow formation of four type of non-equilibrium microstructures: i) monophase amorphous; ii) nanocrystalline microstructure (fcc-Al crystals with nanometric size of 3-50nm in an amorphous matrix); iii) nanoquasicrystalline microstructure (icosahedral crystals with a nanometric size in an fcc-Al matrix); iv) microstructure of intermetallic compounds in nanometric size around 50nm in a fcc-Al matrix with 100-200 nm grain size). We present our two recent developments. The first case is about consolidation of atomized Al-Fe-Cr-Mn alloy powders, which produced an extruded sample with nanoquasicrystalline microstructure, presenting yield strength of 283 MPa and tensile strength of 333 MPa and hardness of 105 kgf/mm². The second case is about consolidation of high energy ball milled Al-Fe-Zr alloy, which produced an extruded sample with nanocrystalline microstructure, presenting tensile strength of 702 MPa (in compression) e micro-hardness 255 HV0.1.

ORAL PRESENTATIONS

A-001 X-RAY TOOLS TO ANALYZE NANOSTRUCTURES

M.C.A. Fantini – USP, Instituto de Física, Laboratório de Cristalografia, Caixa Postal 66318, 05315-970, São Paulo, SP, Brazil.

The X-ray techniques have specific technical adequacy to analyze the structural properties of nanostructured systems. Among them, X-ray diffraction, at wide (XRD) and low angle (SAXRD), is used to investigate the degree of crystallinity, crystalline texture, and lattice parameters. Examples are the formation of Au nanoclusters in an oxide matrix and ordered mesoporous silica, using polymeric template. Also, the presence of metals or organic compounds inside the mesoporous systems can be detected by SAXRD. The combination of Small Angle X-ray Scattering (SAXS) and Transmission Electron Microscopy provide complementary information on the size and type of nanoclusters. Examples are NiO_xH_y and Au:NiO_xH_y sols, in which the size of particles are controlled. These sols are used to prepare thin films with selective absorption. In the case of amorphous systems or local structural modifications due to the presence of other chemical elements, the X-ray absorption spectroscopy (XAS) is a powerful tool to investigate selectively, the local order around a specific chosen atom. The information is given by means of X-ray Absorption Near Edge Structure (XANES) and Extended X-ray Absorption Fine Structure (EXAFS) measurements. Examples are the Si agglomeration in a-SiO_xN_y thin films deposited by Plasma Enhanced Chemical Vapor Deposition (PECVD), that present luminescent effect and the incorporation of metals in MoO_x thin films, improving their catalytic response.

A-002 MECHANICAL PROPERTIES OF NANOWIRES AND NANOSPRINGS

A. F. da Fonseca, C. P. Malta - IFUSP - Instituto de Física da Universidade de São Paulo, Rua do Matão Travessa R 187, CEP 05508-900, São Paulo, SP, Brazil; D. S. Galvão - IFGW

One-dimensional nanostructures like nanotubes and nanowires have attracted increasing attention from the scientific and technological communities because of their versatile electrical, optical and mechanical properties. The study of the elastic behavior of these nanostructures is an important step towards their mechanical characterization. In this work, the elastic properties of amorphous nanowires and nanosprings are studied within the framework of the Kirchhoff rod model. Two experimental schemes are proposed to obtain the Young's modulus and the Poisson's ratio of their composite material. These magnitudes can be derived from expressions relating elastic properties to some topological features coupled to applied forces and torques. The obtained values are in very good agreement with the available experimental data. Another important result from our model is that intrinsic curvature increases the dynamical stability of these nanostructures and might explain why the presence of catalytic particles (that induce intrinsic curvature) is so important in the process of growing nanostructured materials.

- A-O03 SCANNING PROBE MICROSCOPY STUDIES OF MAGNETIC HOPG SAMPLES
M. I. N. da Silva - DF - ICEX – UFMG, CP 702, 30123-970 Belo Horizonte, MG, Brazil; M. A. Cotta, Y. Kopelevich -UNICAMP

Characterization of materials at micro and nanoscopic scale is of great importance for better understanding their physical properties. Recently, a considerable interest has been arisen to graphite due to its ferromagnetic-like behavior. The results suggest a local character of the ferromagnetism in graphite. In this work we present morphological, magnetic and electrical characterization of highly oriented pyrolytic graphite (HOPG) samples by means of Scanning Probe Microscopy (SPM). The Atomic Force Microscopy (AFM) was used to study the morphology of HOPG samples, while Electrostatic Force Microscopy (EFM) and Conductive-AFM (C-AFM) provided access to the electrical properties of the samples. The EFM measurements suggest a local accumulation of the electrical charge at some points of the sample surface. This conclusion is supported by the C-AFM measurements that revealed a variation of the local conductivity from point to point at the sample surface. Magnetic Force Microscopy (MFM) experiments were also carried out on these samples. With this technique we were able to observe ferromagnetic domains in HOPG for the first time. An enhanced MFM signal at some step-like edges on the sample surface suggests a connection between the magnetic behavior and the localized charge observed in the electrical measurements.

- A-O04 STRUCTURAL AND ELECTRONIC PROPERTIES OF Au-Pt BIMETALLIC NANOPARTICLES STUDIED BY SYNCHROTRON RADIATION TECHNIQUES
L. Giovanetti, J. M. Ramallo-López, F. G. Requejo - Dto. Física, FCE, UNLP e IFLP (CONICET). CC67- CP 1900 La Plata, Argentina; D. García-Gutiérrez, M. J. Yacaman - The Texas Materials Institute, University of Texas at Austin, Austin, USA; A. Craievich - Instituto de Física, USP, San Paolo, Brazil.

The synthesis and characterization of metal nanoparticle is an active research field in material science. As expected, the metal nanoparticles will exhibit novel catalytic properties different from the bulk metal or the single atom. In particular, bimetallic nanoparticles can improve the catalytic performance, especially in bifunctional catalysts. This improvement can be explained in terms of the structure and electronics of these new entities. Synchrotron radiation techniques as X-ray absorption spectroscopies (EXAFS and XANES) and Small Angle X-ray Scattering (SAXS) are particularly suitable to investigate these features. Mono and bimetallic core-shell Pt and Au-Pt nanoparticles were synthesized by the polyols method and stabilized in a PVP solution. Their electronic and structural characteristics and their variations as function of the temperature of preparation were studied by EXAFS and XANES experiments at the L2 and L3 absorption edges of Pt and Au. Structural properties of the nanoparticles were also investigated by SAXS and transmission electron microscopy.

- A-O05 CANCELED

- A-O06 TAILORING THE SIZE AND SHAPE OF NOBLE METAL COLLOIDAL NANOPARTICLES
T. C. R. Rocha, D. Zanchet - LNLS/UNICAMP - Laboratório Nacional de Luz Síncrotron, Giuseppe Maximo Solfaro, 10000, Campinas, Brazil.

Noble Metal nanoparticles (NPs) exhibit size and shape dependent optical properties that are of great interest in different applications from biosensing to sub-wavelength optics. These properties are due to collective oscillations of conducting electrons known as surface plasmons. Recent works have demonstrated that the visible light absorption by NPs can be used to tune the particle size and shape in photochemical processes. In this work, we report the photochemical growth of rod-like Au and flat Ag NPs in solution with controlled aspect ratios. In both cases, a metallic precursor is photo-reduced in aqueous solution in the presence of a surfactant. The control of the aspect ratio of the Ag NPs is attained through the wavelength of the incident light and appears to be driven by surface plasmon excitation. This approach allows a fine tuning of Ag NP in the size range of 20-120nm. In the case Au NPs, the rod-like morphology is controlled by addition of small amounts of Ag ions to the initial solution. The growth process and the morphological transformations occurring during the synthesis have been monitored by time-dependent UV-VIS spectroscopy. Detailed transmission electron microscopy studies have also been carried and correlated with the experimental data through simulated UV-VIS spectra.

- A-O07 ATOMIC SIZE NANOWIRES FROM METALLIC ALLOYS
D. S. Galvão, F. Sato, D. Ugarte - UNICAMP - CP 6165 CEP 13081-970; A. S. Moreira - UFJF; J. Bettini, P. C. Silva - LNLS; P. Z. Coura, S. O. Dantas – UFJF; S. B. Legoas - UFAM.

Linear atomic suspended chains (LACs) have been intensively investigated in the past years. From the experimental point of view, two techniques have been mostly used: mechanically controllable break junction (MCBJ) and in situ high-resolution transmission electron microscopy (HRTEM). The former is more appropriate for conductance experiments while the latter one to real time visualization of structural atomistic features. Most studies have been focused on pure noble metals such as, Au, Ag, Pt, Cu, etc.. Among important questions are the atomistic mechanism associated with the elongation and rupture of alloy nanocontact and whether it is possible to obtain LACs. In this work we report theoretical and experimental HRTEM results for the stretching of metallic alloy nanocontacts and the formation of linear suspended atomic chains from Ag/Au and Au/Cu alloys. The theoretical data are from tight-binding molecular dynamics using second moment approximation. Our results show that the formation atomic chains very similar to those obtained from pure metals is also possible from metallic alloys. One interesting feature of these systems is that the linear chains are mainly composed by gold atoms even when gold is present only in small amounts. From the simulations it was possible to determine that the atoms composing the chains come almost always from the external alloy layers.

- A-O08 MAGNETIC FEATURES OF FE SMALL PARTICLES SUPPORTED IN Ag AND Cd FILMS
E. B. Saitovitch, P.E. Munayco, D. Sanchez, H. Micklitz, M. Ghafari – CBPF, Rua Dr. Xavier Sigaud 150, URCA, 22290-180, Rio de Janeiro, Brazil

Fe nanoparticles are formed by precipitation of Fe monomers in metallic film matrices. The samples are prepared by vapor co-deposition of Ag or Cd metal with ~1% of Fe at low temperatures, in a special evaporator cryostat. This process leads, initially, to the formation of Fe monomers, followed by Fe precipitation under thermal annealing, due to the immiscibility between the two metals. Magnetization measurements combined with ^{57}Fe Mössbauer spectroscopy under applied external magnetic field, above the blocking temperature, allow estimating the moment and the diameter of the Fe nanoparticles.

A-O09 DEPTH DEPENDENCE OF THE LOCAL STRUCTURE IN MAGNETIC THIN FILMS WITH PERPENDICULAR ANISOTROPY

N. M. S. Neto, A. Y. Ramos, H. C. N. Tolentino, A. D. Santos, A. Martins - LNL & IF-USP - Laboratório Nacional de Luz Síncrotron - LNL, P.O. Box 6192, 13084-971, Campinas, São Paulo, Brazil.

In view to increase the density of information stored in magnetic media, it has been proposed the use of polar magneto-optical effect (the so called polar Kerr effect). In this sense, the research in the field of thin magnetic films with perpendicular anisotropy has increased in the last years. Besides the perpendicular anisotropy, also high coercivity is a desirable property for candidate materials. These properties are found in near-equiatom FePt, CoPt and FePd films with the ordered FCT(001) structure. Aiming to optimize the magnetic and structural characteristics, as a function of film thickness, we investigate the thickness dependence of the local properties in FePt and FeCo films prepared by dc magnetron sputtering over MgO(100) substrates. The experimental technics are based on grazing incidence x-ray absorption, where the penetration length can be changed by varying the incident angle close to the total reflection angle ($\sim 0.3^\circ$ at 6.5KeV, Mn K-edge), providing a depth sensitive local probe. Preliminary structural and compositional characterization are made by use of X-ray diffraction (XRD) and Rutherford Backscattering (RBS) analysis. Near edge x-ray absorption spectroscopy and X-ray magnetic dichroism were used to study the depth dependence of local atomic, electronic and magnetic structures at the magnetically active site in selected films. We report here the first significant results of this study.

A-O10 INFLUENCE OF THE INTERPARTICLE INTERACTIONS ON THE ORDERED STATE IN FE₃O₄ NANOPARTICLES

G. F. Goya - IFUSP - de Física, Rua do Matão #187 - Caixa Postal 66318 - CEP 05315-970.

The effects of increasing interparticle interactions on the magnetic properties of Fe₃O₄ nanoparticles dispersed in a frozen liquid carrier have been studied. Ball-milled (BM) samples using methanol (CH₃OH) as a carrier liquid yielded the control on both the mean particle size ($\langle d \rangle \sim 7-10$ nm) and size distribution ($\sigma \sim 0.55-0.77$), achieved through an appropriate choose of the milling time for each concentration. All samples displayed superparamagnetism at room temperature, although the dynamics of the collective ordering process at low temperatures (TB $\sim 10-20$ K, depending on particle concentration) was found to gradually change with increasing particle interactions. For samples having 3% wt. of magnetic particles, dynamic ac susceptibility measurements across TB showed the expected thermally activated Arrhenius dependence of the blocking temperature with applied frequency. This behavior was found to change as interparticle interactions begin to rule the dynamics of the system, yielding a spin-glass-like state at low temperatures for 50 wt.% sample. In the latter case full static scaling of the ac susceptibility was achieved with critical parameters $TC = 18(1)$ K, $(\beta) = 3.9(4)$, and $z(\nu) = 21(1)$.

A-O11 PREPARATION OF ELECTRODEPOSITED Co NANOWIRES

V. R. Caffarena, A. P. G. Filho - CBPF, Dr. Xavier Sigaud, 150 - Urca - RJ, Brazil, ZIP CODE: 22290-180; R. A. Simão, J. L. Capitaneu - PEMM-COPPE

Nanostructured magnetic materials have great interest because of their unusual behaviour and various applications. Electrodeposition of materials into porous alumina arrays is a great technique to produce nanomaterials, because highly ordered uniform nanomaterials can be obtained simply and cheaply. In this work, template-assisted Co nanowire arrays were prepared by electrodeposition into nanometer-sized pores of an alumite film using a two-electrode electrochemical cell. Co nanowires were electrodeposited from a solution of 400 g/l of CoSO₄.7H₂O and 40 g/l of H₃BO₃. The morphology of the samples was investigated by means of TEM and AFM. The structural characteristics of the samples were examined using X-ray diffraction and FTIR.

A-O12 EXFOLIATION AND GRAFTING OF SILANES IN LAYERED MATERIALS: A NEW STRATEGY TO PRODUCE POLYMER NANOCOMPOSITES WITH OPTIMIZED MECHANICAL PROPERTIES

F. Wypych, K.G. Satyanarayana - UFPR - Departamento de Química, Laboratório de Química do Estado Sólido, CP 19081, 81531-990, Curitiba, Paraná, Brasil.

Based on the ability to be exfoliated, synthetic and natural layered compounds in the form of single layers, can be chemically grafted with key and interesting molecules (silanes, alkylphosphonates, etc.), which can be used to promote adhesion between the single layers and the polymer. The grafted molecules can carry reactive groups (like vinyl, amino, epoxy, etc.) to be bonded to the polymeric matrix, interact by interpenetration or by polar similarity. The proposed strategies can also be applied to specific natural and synthetic fibers, which can have the functionalized surfaces. This procedure has not yet systematically explored as evidenced by the specialized literature and can be used to produce nanocomposites with optimized dispersion, interfacial bonding and mechanical properties. This paper presents the above mentioned new alternative strategies to optimize the design of polymer/layered compounds/fibrous nanocomposites.

A-O13 TiO₂ NANOCRYSTALS INTO A POROUS VYCOR GLASS: ACHIEVING THE COALESCENCE CONTROL

I. O. Mazali, O. L. Alves - IQ – UNICAMP - LQES - Laboratório de Química do Estado Sólido, Cidade Universitária Zeferino Vaz, Campinas, SP, Brazil, P.O.Box 6154, Zip Code: 13084-971; A. G. S. Filho, J. M. Junior - Departamento de Física – UFC.

This work reports the preparation of nanocrystalline TiO₂ anatase into the pores of a porous Vycor glass (PVG). The TiO₂ nanocrystals were prepared by metallo-organic decomposition process by using the impregnation-decomposition cycle (IDC) methodology. It is well-known that for photocatalysis purpose the anatase is more effective than rutile and the performance of TiO₂ depends on crystallite size. The IDC protocol carried out at 750°C/8h, repeated 10 times on the same monolith of PVG revealed a linear mass increment inside the PVG. The crystallite size as function of IDC number was monitored by considering the shift and linewidth of the Eg Raman active mode of anatase TiO₂. We have observed that both frequency and linewidth decreases as the number of IDC increases. This phenomenon is attributed to a size induced effect. By fitting the Raman profiles to a phonon confinement model we have monitored the crystallite size. A very good agreement with TEM results was obtained. Our characterization data indicated that the growth of crystallite size is a function of the mass increment only (via IDC) and do not depend on the period of the thermal treatment. The inhibition of crystallites growth can be controlled. Such a control might be the consequence of the size restriction imposed by the pores and/or can be associated with having crystallites dispersed on the porous structure and anchored through Ti-O-Si linkages. This would prevent their growth through the coalescence processes.

A-O14 CHARACTERIZATION OF POLYPROPYLENE/LAYERED SILICATES NANOCOMPOSITES USING TEM

T. P. R. Cristina, M. A. J. Augusto - DEMa- UFSCar, Rua Rui Barbosa, 1376 - São Carlos, São Paulo – Brasil, CEP 13560-330; C. Giovanni - UNITO; G. Walter - CDCMP-UNITO; F. Giuseppe, P. Gianpaolo - Basell.

In order to extend the standard Polyolefins (PO) properties and to compete with other products, the most important polyolefin producers are strongly interested in evaluating and exploring nanofillers, as an alternative to conventional reinforcing agents like talc, wollastonite, calcium carbonate, etc. This quite recent nano technology is appealing as it seems to be able to overcome certain application limits of existing grades. Property enhancement is a consequence of both higher surface and higher aspect ratio, in comparison with conventional fillers. The most common nanofiller for PO is montmorillonite, which can be organically modified to get it more compatible with polymer matrixes. Hybrid structures, either intercalated or exfoliated, have been observed when PO has been compounded with a relatively small amount of montmorillonite in presence of polypropylene grafted with maleic anhydride (PP-g-MAH) acting as a compatibilizer, which promotes clay exfoliation and adequate interfacial adhesion between filler and polymer. The goal of this work is to investigate the formation of nanocomposites using polypropylene and layered silicates. This characterization of the obtained materials was performed by X-ray diffraction (XRD) and transmission electron microscopy (TEM). Was possible to verified the formation of a exfoliated nanocomposite structure.

A-O15 CdS/TiO₂ NANOCOMPOSITE: RAMAN SPECTROSCOPY AND PHOTOCATALYTIC ACTIVITY

M.T.C. Sansiviero, J. Tristão, F. Magalhães - Depto de Química/ICEx/UFMG. Av. Antônio Carlos, 6627, Belo Horizonte, MG, CEP 31270-901; P. Cório - IQ/USP; V. C. Costa - CDTN.

Titanium dioxide is a semiconductor used as a photocatalyst active in the UV region. The coupling of different semiconductors with appropriate energy levels is an interesting approach and can produce a more efficient photocatalysis for organic contaminants degradation by absorption in the visible. In this work, we report the preparation of cadmium sulfide/titanium dioxide nanocomposite system containing 1, 3, 5, and 10 mol % CdS. The samples were studied by Raman spectroscopy and photocatalytic experiment. The photocatalytic activity of the nanocomposites was studied by oxidation of the dye Drimaren Red in aqueous medium (50mgL⁻¹). Preliminary studies indicate for the 5 mol % CdS composite best catalytic activity ($k = 0,0200 \pm 0,0001 \text{ min}^{-1}$) than TiO₂ ($k = 0,0152 \pm 0,0001 \text{ min}^{-1}$). The Raman experiment were done with different excitation wavelengths: 514.5, 632.8, and 1064 nm. The Raman peaks at 143, 199, 397, 518 e 639 cm⁻¹ were assigned to characteristic bands of anatase phase of TiO₂. CdS Raman features were strongly dependent on the excitation wavelength. For excitation at 514.5 nm, the Raman spectrum shows characteristic first and second order CdS vibrations at 304 cm⁻¹ and 600 cm⁻¹, due to the resonance with the CdS band gap. With excitation at 1064 nm, the observed peaks were located at 151, 219, 238, 304, 988 cm⁻¹. A interaction between the different semiconducting materials was revealed by Raman spectroscopy through the shifting and broadening of characteristic TiO₂ bands.

A-O16 PHOTOLUMINESCENCE FROM NOVEL GOLD-(CONDUCTING POLYMERS) NANOCOMPOSITES

C. G. dos Santos, J.D. Ribeiro-Filho, C.P. de Melo – UFPE, Av. Prof. Luiz de B. Freire s/n, Cidade Universitária, Recife, Pernambuco, Brazil, 50670-901.

It is well known that metal (such as gold and silver) nanoparticles exhibit novel size-dependent optical properties that cannot be explained classically. As a consequence, the control of the morphology of nanosize metal particles is of critical concern for the possible use of these materials in future applications. In this work we report the first observation of visible photoluminescence from gold-(conducting polymers) nanocomposites (NC). Conducting polymers (CP) encapsulating gold nanoparticles have recently been prepared in which the metal nanoclusters are immersed into a polymeric host system. We focus our study on the photoluminescence of gold NC formed in solution of ethyl alcohol without the need of using the common reducing agents such as sodium citrate ($\text{Na}_3\text{C}_6\text{H}_5\text{O}_7 \cdot 2\text{H}_2\text{O}$) or sodium borohydrate (NaBH_4). Instead, chloroauric acid ($\text{HAuCl}_4 \cdot x\text{H}_2\text{O}$) was adopted as oxidizing agent for the polymerization of the monomers during the preparation of the NC. In our studies we used polypyrrole (PPY), polyethylenediothiophene, polyaniline and poly(3-ethyl acetate) thiophene as host polymers under different conditions of synthesis. The ultraviolet-visible spectra of the resulting gold-CP composites confirm the presence of the characteristic polaron band of the doped polymer. An unexpected photoluminescence was identified in gold-PPY NC when incorporated into a polyvinyl alcohol matrix, while all others systems presented an enhanced photoluminescence when in solution.

A-O17 LOW TEMPERATURE SYNTHESIS OF PEROVSKITE LEAD TITANATE NANOPARTICLES BY OPM-HYDROTHERMAL METHOD

C. M. Barrado, E. R. Camargo, E.Longo, E. R. Leite - UFSCar – Liec, Dep. Química, Rod. Washington Luís (SP-310), Km 235 - São Carlos - SP - Brasil - CEP: 13565-905

PbTiO_3 was synthesized from the direct use of the OPM amorphous. This new precursor for hydrothermal crystallization was first prepared at room temperature without the use of alkoxides or chloride. The OPM-amorphous was then submitted to treatments hydrothermal in a home-built autoclave to obtain the phase-pure perovskite powder at temperatures as low as 150°C for 2h, using KOH solution as mineralizer. Addition of lead equivalents during the hydrothermal treatment was found to be effective for the synthesis of perovskite phase PbTiO_3 to compensate for loss of lead species during the hydrothermal crystallization. The variation of that equivalent and temperature of the reaction hydrothermal made possible the creation of an indicative diagram of formation of the phases PbTiO_3 , $\text{Pb}_2\text{Ti}_2\text{O}_6$ and lead phases, from OPM method. The use of an ultrasonic treatment before the hydrothermal processing promoted a homogeneous distribution of particles size with low agglomeration. The products were characterized in detail by XRD, Raman spectroscopy and TEM.

A-O18 THE DEVELOPMENT OF SPRAY-PYROLYSIS FOR THE PREPARATION OF LUMINESCENT SUB-MICRONIC POWDERS

J. Dexpert-Ghys, M. Verelst, Y. Kihn, L. Bucataru - CEMES-CNRS, BP 94347, 31055 TOULOUSE Cx France; N. Joffin - DGTec-SAS, 38430 MOIRANS France

Micronic and submicronic particles present a large range of potential industrial applications. Unfortunately, most of the methods used for elaboration of submicronic particles must be considered more like laboratory tools than real industrial processes. On larger scales, spray pyrolysis is a very attractive method for industrial applications, as we demonstrated in the case of inorganic phosphors for PDP (Plasma Display Pannels) production. From the laboratory-scale apparatus schematized in Figure1, a pilot-scale set-up was built at CEMES laboratory; this set-up will be described. The characteristics of the well known red ($Y_2O_3:Eu^{3+}$) and green ($Zn_2SiO_4:Mn^{2+}$) phosphors synthesized by the spray-pyrolysis method will be presented and discussed.

New materials may be synthesized as well, especially nano-composite materials such as the one shown in Figure 2 : luminescent crystals in the 10-150 nm size range are embodied in an optically neutral matrix, whereas the size of each sphere is sub-micronic. New possible developments will be presented.

A-O19 SYNTHESIS OF ITO NANORIBBONS WITH DIFFERENT Sn:In RATIOS

M. O. Orlandi, E. R. Leite, E. Longo - UFSCar - Laboratório Interdisciplinar de Eletroquímica e Cerâmica, Rod. Washington Luis, Km 235, CEP 13565-905, São Carlos, SP, Brasil.

One dimensional (1D) nanostructured materials has been widely investigated in the recent past years because of their interesting properties. In this work we present a simple route to produce Indium Tin Oxide (ITO) nanoribbons with different Sn concentration. The nanostructured materials were obtained by co-evaporation method that consist in put two crucibles (one of tin oxide and another with indium oxide) in the center of a tube furnace which the temperature, evaporation time and atmosphere flux were controled. In this work we have utilized the follow setup: 1200 °C, 2 hour of evaporation and nitrogen atmosphere with a flux of $50 \text{ cm}^3 \text{ min}^{-1}$. To help in the evaporation process, carbon black was mixed in each oxide powder with several molar percentages. The obtained material had a wool like appearance and was characterized by X-ray diffraction (XRD), transmission electron microscopy (TEM), scanning electron microscopy (SEM) equipped with energy dispersive X-ray spectroscopy (EDX) and wavelength dispersive X-ray spectroscopy (WDX). The results show that wool like material has retangular section transversal (nanoribbons), are single crystalline and have different Sn:In rates depending of the molar concentration of the mixture of oxide and carbon black. This is an interesting result because the literature shows that both electrical e optical properties of ITO depend of the Sn:In ratio.

A-O20 STUDY OF IN SITU ORIENTED CRYSTAL GROWTH IN A CERAMIC NANOSTRUCTURED SYSTEM

C. Ribeiro, E. J. H. Lee, T. R. Giraldo, R. Aguiar, E. Longo, E. R. Leite - LIEC - UFSCar, Rod. Washington Luiz km 235 - Sao Carlos, SP, Brazil.

We report here on an in situ experimental analysis of the growth processes of tin dioxide nanoparticles (with mean particle radius of less than 5 nm) and the oriented attachment of these particles onto SnO₂ nanobelts, used as single crystalline substrates, through electron irradiation by transmission electron microscopy (TEM). Characterization by high resolution transmission electron microscopy (HRTEM) indicates that grain growth occurs in the solid state by a two-step process consisting of grain rotation followed by coalescence. The grain rotation is likely induced by the thermal energy provided by the electron beam. Coalescence or oriented attachment occurs preferentially on particles with similar crystallographic orientations.

- A-O21 ELECTRICAL TRANSPORT IN InAs/InP WIRE-DOT ASSEMBLIES
K.O. Vicaro, H.R. Gutierrez, J.R.R. Bortoleto, L. Nieto, A. A. G. von Zuben, P.A.Schulz, M.A. Cotta - UNICAMP – IFGW, CP 6165, 13081-790 Campinas, SP, Brazil; A. C. Seabra - USP, LSI-EPUSP

In this work we use conductive atomic force microscopy (C-AFM) and electron-beam lithographically-processed devices to investigate the electrical properties of InAs/InP semiconductors wires and dots. Spatially resolved current images and localized IV curves are obtained with C-AFM technique (in a controlled atmosphere) and provide information about vertical transport across the nanostructure. The processed devices were used in order to access the in-plane conductance of a small assembly of nanostructures. On these devices, fluctuations on I-V curves at temperatures around 20K are observed for mesa orientations both parallel and perpendicular to the wires long axis direction. At these low temperatures, the signature of random telegraph signals in the current behavior with time at constant applied voltage is observed. The energy values for the onset of current fluctuations correlate well with threshold voltages and barrier heights obtained from C-AFM I-V curves for individual nanostructures. A transition between conduction via the low dimensional nanostructures to the continuum associated to the wetting layer is observed with increasing temperature. These results suggest transport via hopping through localized states of quantum wires and dots.

- A-O22 SiO₂/PbTe QUANTUM DOT OPTICAL SWITCH
L. C. Barbosa, E. Rodríguez, E. Jimenez, G. J. Jacob, A. A. R. Neves, C. L. César, M.A.Cotta – UNICAMP, Cidade Universitaria Zeferino Vaz s/n - Campus Barão Geraldo, Campinas, SP, Brazil. CEP 13083-970.

We report the successful fabrication of multilayer structures as optical switch containing layers of PbTe quantum dots (QD) spaced by 15-20 nm thick SiO₂ layers. The QDs were grown by the laser ablation of a PbTe target using the second harmonic of Nd:YAG laser in an argon atmosphere. The SiO₂ layers were fabricated by Plasma Chemical Vapor Deposition using tetramethoxysilane (TMOS) as precursor. The influence of the ablation time and the laser fluence on the size, size distribution and density of the quantum dots was studied by High Resolution Transmission Electron Microscopy (HRTEM). Optical absorption measurements show clearly the QDs confinement effects. We produced three sets of samples: one with 11 layers deposited on a Si (100) wafer was used for the HRTEM measurements, the other with 60 layers deposited on BK7 corning glass was used for optical measurements, and the last one consisted of only one layer of SiO₂/PbTe/SiO₂ grown directly on carbon film to study the morphology of a single isolated quantum dot by HRTEM. (CEPOF/FAPESP/UNICAMP/LNLS)

A-O23 CRYSTAL GROWTH IN COLLOIDAL NANOCRYSTALS: COALESCENCE OR COARSENING

E. R. Leite, E. J. H. Lee, C. Ribeiro and E. Longo – LIEC – CMDMC – UFSCar, Rod. Washington Luis, Km 235, CEP 13565-905, São Carlos, SP, Brasil.

The particle growth process in colloidal nanocrystal systems is usually associated with the Ostwald-ripening mechanism (growth of large particles in detriment of smaller ones). Here, we report on experimental results indicating that another crystal growth process took place in a colloidal nanocrystal system at room temperature. This crystal growth process is based on particle-particle collision and particle rotation among neighboring particles, resulting in a coherent particle-particle interface, which, by eliminating common boundaries, causes neighboring particles to coalesce, thereby forming a single larger particle. This phenomenon was observed in SnO₂ nanocrystals (particle size ranging from 10 to 50 Å); however, we believe that this crystal growth process can occur in other systems, in special colloidal nanocrystals with very low solubility. The identification of this mechanism is fundamental to understanding the overall process of particle growth in nanostructured materials.

A-O24 STABILITY OF NANOWIRES IN InAs/InGaAs/InP STRUCTURES

L. Nieto, J.R.R. Bortoleto - UNICAMP – IFGW, Cidade Universitária Zeferino Vaz - CP 6165 - Campinas, SP, Brazil; H.R.Gutiérrez - Penn State University - Dept.Physics, USA; R.M. Paniago - UFMG - ICEX, Belo Horizonte, MG, Brazil.

Nanostructures of InAs in matrix of InP or related compounds have received much attention in the last years due to their application in light-emitting devices. In this work we present results on the epitaxy of InAs nanowires on InGaAs lattice-matched to (100) InP by Chemical Beam Epitaxy. The influence of the InGaAs layers on the size and spatial distribution of the InAs NWr's was analyzed using Atomic Force Microscopy (AFM) and High Resolution Transmission Electron Microscopy (HRTEM). The role of strain fields on stability and nanostructure self-organization was investigated by Grazing Incidence X-ray Diffraction (GIXD). We observed that the nanostructure stability depends on the thickness of the InGaAs layer. The nanowire shape anisotropy is preserved for InGaAs layers up to 80 nm thick, even if small deviations (~0.15%) of the InGaAs lattice parameter with regard to InP occur. For thicker InGaAs layers, however, the nanowires are shorter in the AFM images, and a large number of dots is observed on the surface, for the same InAs growth conditions. GIXD results show that for thin InGaAs buffer layers the relationship between the two in-plane lattice parameters is very similar to InAs grown on InP, both for wires and dots. InAs deposited on thicker InGaAs layers, however, exhibit a different behavior for this relationship. These results suggest an important role for the underlying InP material in the strain relaxation of InAs nanostructures grown on InGaAs/InP buffer layers.

A-O25 STRAINED InP NANOWIRES

J. C. González, E. Ribeiro, F. M. Matinaga, M. I. N. da Silva - UFMG - Departamento de Física, Instituto de Ciências Exatas, Universidade Federal de Minas Gerais, Caixa Postal 702, 30123-970, Belo Horizonte, MG, Brasil; X. J. Sanchez, D. Zanchet, D. Ugarte - LNLS; H. R. Gutierrez - PSU; M. A. Cotta - UNICAMP.

Free-standing InP nanowires were grown on (100) InP substrates by the vapor-liquid-solid growth process in a chemical beam epitaxy reactor. Gold nanoparticles were used as catalysts. These nanowires have single crystalline zinc blend structure. A careful examination into x-ray and selected area electron diffraction revealed that the separations of the neighboring lattice planes along the growth direction are larger than those of bulk InP. These nanowires would experience biaxial compressive stress in the inward radial direction and the induced tensile uniaxial stress in the growth direction, producing a tetragonal distortion of the cubic crystalline structure. Photoluminescence spectroscopy measurements confirmed a blue shift of the nanowires band gap, in agreement with the compressive biaxial stress measured in the diffraction experiments. A large exciton binding energy of approximately 40 meV was also observed in the photoluminescence experiments. This large binding energy is explained in terms of a strong dielectric confinement of the heavy-hole excitons, due to the large dielectric contrast between the nanowires material ($k \sim 9.61$) and the surrounding media (air, $k \sim 1$).

A-O26 CARBON DOPED NANOPOROUS ALUMINUM OXIDE: A NEW NANO-STRUCTURED MATERIAL FOR IONIZING RADIATION DOSIMETRY

W. M. de Azevedo, E. F. da Silva Jr, H. J. Khoury - UFPE - Departamento de Química Fundamental, CCEN, Universidade federal de Pernambuco, 50670-901, Recife-PE, Brasil.

In nanotechnology research, the development of functional nanoscale structures and devices, in a well-controlled way and using inexpensive fabrication techniques, represents a challenge for all scientific community. Due to the small dimensions of these nanoelements, a bottom-up self-assembly process such as aluminum anodization has been employed to synthesize a variety of nanoparticles and nanowires through a template-mediated approach. On the other hand, anion-defective Al₂O₃:C single crystals, has been used as a dosimeter device, due to its high optical, chemical and thermal stability under irradiation and, higher sensitivity than widely known thermoluminescent devices such as the TLD-100. However, the well established crystal growth technique for Al₂O₃:C single crystals require a sophisticated laboratory infrastructure at high temperatures, using highly reducing atmospheres, which often may not be easily available in common laboratories. In this work, we present the detailed development of a simple and straightforward route of synthesis to prepare highly sensitive thermoluminescent carbon-doped nonoporous aluminum oxide at low temperatures, using the anodization process under several solvents, and discuss its photoluminescent and thermoluminescent properties as a function of the synthesis medium. Preliminary results show a very sensitive response to low energy X-ray radiation and a linear dependence with the X-ray dose only when the samples are synthesized in organic acid.

A-O27 IRIDIUM NANOPARTICLES IN IMIDAZOLIUM IONIC LIQUIDS: SYNTHESIS AND CHARACTERIZATION BY TEM

G. Machado, G. S. Fonseca, J. Dupont, S. R. Teixeira – UFRGS, Bento Gonçalves 9500.

Herein we report the use of room temperature imidazolium ionic liquids for the formation and stabilization of iridium nanoparticles that are recyclable catalysts for the biphasic hydrogenation reactions. Ir(0) nanoparticles were prepared by simple reduction of the organometallic precursor [Ir(cod)Cl]₂ in 1-n-butyl-3-methylimidazolium hexafluorophosphate ionic liquid under 4 atm of molecular hydrogen constant pressure. The particles display an irregular shape parametrized by a characteristic diameter which shows a monomodal distribution with a mean diameter of 2.03 nm. Energy Dispersion Spectrometry indicates the presence of Ir and Selected Area Diffraction shows ring patterns which can be fitted to simulation based on Ir(0) parameters (SG Fm3m (#225) a= 3.8394). Moreover, Ir(0) can be clearly identified from the X-ray spectrum (measured in a Bragg-Brentano geometry) of the nanoparticles isolated after the reaction. Using the Sherrer equation and assuming spherical particles, the mean diameter of the Ir(0) particles was estimated to be around 2.5 nm, in good agreement with the TEM images. In summary we have demonstrated that the room temperature imidazolium based ionic liquid is not only a suitable medium for the preparation and stabilization of transition-metal nanoparticles but also ideal for the generation of recyclable biphasic catalytic systems.

A-O28 CONTROLLED SYNTHESIS OF ISOLATED SUSPENDED SINGLE WALL CARBON NANOTUBES BY CHEMICAL VAPOR DEPOSITION

A. S. Ferlauto, F. Plentz, C. Fantini, M. A. Pimenta, L. O. Ladeira - UFMG - Departamento de Física - ICEx - UFMG - Av. Antônio Carlos, 6627 - C.P. 702 - CEP 30123-970 - Belo Horizonte - MG – Brazil; J. D. Ardisson - CDTN – CNEN.

We have developed processes to obtain isolated suspended single-wall carbon nanotubes (SWNTs) by chemical vapor deposition. A critical step in the optimization of the SWNT CVD is the formation of catalytic metallic nanoparticles (NPs) having defined size and density. Ultra-thin iron films were sputter-deposited on silicon dioxide substrates, and the NPs were formed by thermal annealing of such films. The SWNTs were produced in a furnace using fixed conditions, viz., pure methane flow at 900°C. AFM images reveal that the surface density of SWNTs is extremely dependent on the thickness of the Fe films. The NTs are mostly isolated, having diameters <2 nm, indicating that they are single-walled, result confirmed by Raman spectroscopy. We have used e-beam lithography and reactive ion etching processes to produce patterned SiO₂ substrates consisting of arrays of square pillars with sub-micron size and spacing. Fe films with thickness that result in the highest SWNT yield were deposited over the patterned substrates, which were then subjected to the CVD process. Scanning electron microscopy reveals the presence of nanotubes suspended over the pillars. These samples are being investigated by Raman and photoluminescence spectroscopies for a study of the electronic structure of SWNTs free of external effects commonly present in other types of SWNTs samples. Moreover, the developed processes will allow the study of SWNT transport properties and the production of electronic devices.

- A-O29 ELECTROCHEMICALLY GROWTH OF ALUMINA WITH POLYGONAL POROUS SHAPE
M. L. Cardoso, A. J. A. de Oliveira, E. C. Pereira - UFSCar - Grupo de Supercondutividade e Magnetismo, Rod Washington Luis, km 235, São Carlos, São Paulo, Brazil, 13566-905.

The porous anodic alumina could be used in biology, chemical, semiconductor, and magnetic systems and as photonics crystals. For such applications commercial membranes are commercial, which high price which is related to its purity, tailoring process and quality of its pores. In this sense, to make it cheaper for large scale production, commercial Al foils were used in this work. Its were obtained porous structures with good quality. Therefore, porous membranes where grown on Al with higher thickness in a two steps anodization, which results present the overlap of the pore chains. These membranes are the first step to obtain pores and pore cells with different geometry made up exclusively by the electrochemical methods. The membranes were grown in 0.1 M phosphoric solution under constant current density of 10 and 20 mA/cm² at 6 and 24 degrees, in the different steps of anodization. The film presents pores with Gaussian distribution of size, which average radii of 89±34 nm and 111±27 nm. The results encourage us to use such membranes as catalysts, due to its increase of superficial area, and in ultrafiltration systems.

- A-O30 INFLUENCE OF NANODISPERSOIDS ON HOT MECHANICAL BEHAVIOUR OF DISPERSION-STRENGTHENED COPPER ALLOYS, PREPARED BY REACTION MILLING
R. Espinoza G., R. Palma H., A. Sepúlveda O., C. Ramírez - U. de Chile - Dept.of Mechanical Engineer, Universidad de Chile, Beaucheff 850, 4° Piso, 6511261, Santiago, Chile.

The influence of nanodispersoids formed by reaction milling on the hot mechanical behaviour of Cu-5.0vol.%Al₂O₃, Cu-5.0vol.%TiC and Cu-2.5vol.%Al₂O₃-2.5vol.%TiC alloys was studied. The materials were prepared by reaction milling, starting from elemental powders of the pertinent elements as to form the nominal volume percent. Microhardness measurements at room temperature were used to evaluate the softening resistance of the consolidate materials after 1 h-annealing at different temperatures (400 to 900°C). The results show that the hardness of copper is increase by the addition of Al, Ti and C. The mechanical behavior was evaluated by hot compression tests at 500 and 850°C, at nominal strain rates of 10⁻³ and 10⁻⁴ s⁻¹. An effective reinforcing effect was obtained at high temperatures. The alloy that combine two type of dispersoids, presented a greater resistance to softening and hot deformation than the other alloys. From observations in HRTEM, the presence of TiC (20 to 30 nm) and of Al₂O₃ particles (8 to 20 nm) was observed. The formation of these dispersoids would explain the improvements observed in the mechanical behavior. This behaviour is explained in terms that in the alloys with two types of dispersoids, two strengthening mechanisms would be concurrently operative: incoherent particles (Al₂O₃) would limit dislocation detachment from particles and dislocation climbing, and TiC semi-coherent nanometric particles, would limit grain boundary sliding through pinning.

- A-O31 EFFICIENCY IN POLYMER LIGHT EMITTING DIODES
F.E. Karasz - University of Massachusetts, Polymer Science & Engineering, Amherst, MA 01003 USA

The efficiency of polymer light emitting diodes (and of optically pumped polymer lasers) can be enhanced by taking advantage of the morphologies achievable in polymer blends through the possibility of multiple microconfinement of injected carriers in the chromophore phase domain. Also simplification of fabrication can be achieved by judiciously blending the transport layer and chromophore component(s) in a single layer architecture which provides superior performance dependent on the phase domain morphology of the system. In addition, when two or more polymeric chromophores are employed, Forster energy transfer from the larger band gap system can be used to enhance emission from the smaller band gap system, again provided the correct morphology can be attained. When the charge transport facilitating moieties can also be covalently incorporated in the emitting chromophore(s) to produce enhancement, a combination of these strategies can be employed. The latest results of studies using blend architectures in PLEDs will be discussed.

- A-O32 **MANAGING DISORDER IN GaAs/AlGaAs SUPERLATTICES**
Y. Pusep - IFSC/USP - Universidade de São Paulo, Instituto de Física/Departamento de Física e Ciência dos Materiais, Av.Trabalhador São Carlence 400, São Carlos-SP, Brazil, 13566-560.

Disorder fundamentally influences properties of semiconductors and electronic devices built of them. The control of the disorder effects is strongly desirable for the following reasons: (i) to avoid unpleasant effects, which limits functions of the electronic devices and (ii) to increase the optical response of the opto-electronic devices based on the indirect-gap semiconductors. Artificial crystalline structures such as semiconductor superlattices (SL) grown by molecular beam epitaxy allow for structural atomic-scale engineering resulting in management of their electron properties. Thus, the built-in randomness created during the growth of a SL may be used to model the disorder effects. In this work the artificial random potential built in the GaAs/AlGaAs SLs was explored by various methods, such as band edge photoluminescence, Raman scattering by collective plasmon and phonon excitations, capacitance and magnetoresistance measurements. The effect of the intentional disorder was shown to dominate the intrinsic superlattice imperfections and its impact on the optical and transport properties was found in good agreement with the theoretical predictions. It was demonstrated that the modern state of the molecular beam epitaxy allows for a growth of the superstructured materials where the comprehensive control of the intentional disorder can be achieved.

- A-O33 **ION IMPLANTATION FOR THE FABRICATION OF STRAINED SILICON ON THIN RELAXED SIGE VIRTUAL SUBSTRATES**

D. Buca, B.Holländer, S. Mantl, N. Hueging, M. Luysberg, R. Carius - Institut für Schicht-und Ionentechnik, ISG 1-IT, Forschungszentrum Jülich, D-52425 Jülich, Germany; M.J. Mörschbacher, P.F.P. Fichtner - Instituto de Física, UFRGS, 91501-970 Porto Alegre, Brazil; R. Loo - IMEC, Kapeldreef 75, B-3001, Belgium.

Strained silicon will be used as a channel material in the next generations of CMOS devices. The enhancement of the carrier mobility of the tetragonally distorted silicon allows a considerable improvement of device performance. In this contribution an overview will be given on the fabrication of strained silicon on thin SiGe buffer layers relaxed by the use of He ion implantation. The influence of the implantation parameters, layer thickness and germanium content on the degree of relaxation of the Si_{1-x}Ge_x buffer layers was systematically investigated. He implantation below the Si_{1-x}Ge_x layer induces a defect band in the underlying Si that promotes strain relaxation via preferred nucleation of dislocation loops during annealing. These loops glide to the interface and form misfit segments. We found that for efficient relaxation the optimum parameters lie in the "low dose - deep implant regime". By this rule, high degrees of relaxation up to 80 % and low threading dislocation densities of 3x10⁶cm⁻² were achieved after anneals at 850°C. We will also present the fabrication of thin strained silicon layers by only one epitaxial growth step. Using a "inverse strain relaxation" process strain generation in a thin Si layer by strain relaxation in an epitaxially attached SiGe buffer layer is showed. The samples were investigated by Rutherford backscattering spectrometry, ion channeling, transmission electron microscopy, atomic force microscopy and Raman spectroscopy.

- A-O34 ENERGY MODULATED HETEROSTRUCTURES FOR CHARGE TRANSFER AND CONFINEMENT BASED ON CONJUGATED POLYMERS
F. E. G. Guimarães, M. A. Leite, H. R. Favaram, D. Spadacio, V. Zucolotto, O. N. Oliveira Jr. - IFSC/USP, Av. Trabalhador São-carlense 400, São Carlos, Brazil, CP 369, CEP 13560-970.

It is demonstrated that multilayer structures with modulated band gaps can be used for efficient charge transfer and carrier confinement inside of a light emitting polymer sample. The films were produced with the layer-by-layer technique (LBL) with a poly(p-phenylene vinylene) (PPV) precursor and a long chain dodecylbenzenesulfonate ion (DBS). DBS is incorporated selectively into the precursor chain, and with a rapid, low temperature conversion process (100oC) superstructures with variable HOMO-LUMO gap can be formed along the deposition direction by changing the DBS concentration. Structures with different stair-type energy modulations were produced, which are thermally stable and reproducible, as demonstrated by UV-VIVS absorption measurements. Photoluminescence measurements show that this energy separation is sufficient to produce an efficient charge transfer via Förster processes from the highest energy to the lowest band gap stair. Structures with 2 bilayers of PPV-DBS per stair display higher emission intensities compared to an equivalent highly conjugated PPV layer, demonstrating that emission can be improved in organic semiconductors by carrier confinement in a very thin layer. An acceptor layer based on an azochromophore, separated by an optically inert spacer from the stair structure, was also used to probe the strength and the range of transfer process inside the energy modulated structures.

- A-O35 CHEMICAL PROPERTIES AND STABILITY OF ALUMINUM OXYNITRIDE FILMS ON SI UNDER VACUUM AND O₂ ANNEALING
K. P. Bastos, G. V. Soares, L. Miotti, C. Driemeier - UFRGS - Instituto de Física, Laboratório de Superfícies e Interfaces Sólidas, Av. Bento Gonçalves, 9500, Bairro Agronomia, Porto Alegre-RS, CEP 91509-900, Brazil; I. J. R. Baumvol - UCS.

Aluminum oxynitride films on silicon are candidates to replace the gate dielectric in the next generations of CMOS devices. In this work the effects of post-deposition rapid thermal annealing in vacuum and in dry O₂ atmospheres on the stability of remote plasma-assisted nitrated aluminum oxide films on silicon are investigated. The areal densities of Al, O and N were determined by nuclear reaction analysis and their concentration versus depth distributions by narrow nuclear reaction resonance profiling, with subnanometric depth resolution. The chemical environment of N in nitrated aluminum oxide films on Si(001) was investigated by angle-resolved X-ray photoelectron spectroscopy. Two different bonding configurations were identified, namely N-Al and N-O-Al, suggesting the formation of the AlN and AlO₂N compounds. Oxygen from the gas phase was incorporated in the AlON films in exchange for O and N previously existing therein, as well as in the near-interface region of the Si substrate, leading to oxynitridation of the substrate. The mobile N is partly lost by desorption from the surface and partly fixed by reacting with the network to form AlO₂N. Low-energy ion scattering analyses revealed reduction in the migration of Si atoms from the substrate across the films as compared to non-nitrated Al₂O₃ films confirming that the presence of nitrogen improves the thermal stability characteristics of the AlON/Si structures in comparison with non-nitrated Al₂O₃/Si.

- A-O36 CANCELED

A-O37 CAPACITANCE-VOLTAGE CHARACTERISTICS IN METAL OXIDE SEMICONDUCTOR STRUCTURE CONTAINING NANOSTRUCTURE OF SILICON

S. N. M. Mestanza, J. E. C. Queiroz, G. O. Dias, E. S. V. P. Marins, I. Dóí, J. W. Swart, E. Rodriguez, A. L. Gazoto, H. Martinho - UNICAMP - CCS, Rua Calogeras 90, Campinas, S.P., Brasil, C.P.6165.

Embedded nanostructure in thin insulating layers are key components for prospective memory devices, ion implantation and annealing is a promising technique for their generation. At present, however, the electronic structure of nanostructure in oxide layers and the charge storage mechanism are not well understood. Here we report on the examination of the nanostructure of silicon in of a matrix SiO₂ by using measurements of capacitance-voltage and current-voltage of a Metal-Oxide-Semiconductor (MOS) structure. Silicon dioxide layers with a thickness of 70 nm were grown on a (100) p-substrate of Si, where the silicon was implanted with a dose of 5x10¹⁶ cm⁻² and subsequently annealed at high temperatures (1100°C). The MOS structure with nanostructure of Si shows an ultra-large capacitance-voltage shift whose width is over 4 V in relation to MOS structure without nanostructure. In addition capacitance-time measurement shows a characteristic capacitance transient indicating nondispersive carrier relaxation.

A-O38 A THEORETICAL AND EXPERIMENTAL APPROACH TO COLLOIDAL CdS NANOPARTICLES

P. M. A. de Farias, B. S. Santos, R. Ferreira, R. L. Longo - UFPE- Departamento de Biofísica e Radiobiologia - Centro de Ciências Biológicas, UFPE - Cidade Universitária- Recife- PE- CEP: 50670-901; C. L. César - UNICAMP.

Nanoparticles of semiconductors in the quantum confinement regime present particular features which have called the attention of many research groups, in special in these last two decades. It is well known that the quantum confinement effects are closely related to the existence of different behaviors for the same material composition. Due to the reduced size scale of the nanoparticles, the most part of their forming atoms are at the particle surface, which needs to be as stable as possible, to avoid phenomena such as dissolution and photodegradation. This way, methodologies for semiconductor nanoparticles obtention shall take into account the size, shape and energy of the final product. However, the relationship between these parameters is not yet clearly understood for nanometric systems, specially for those ones which are smaller then the range (20 nm) studied by Lifshitz-Slyozov, and still remains as an unexploited field. In this work we present and discuss experimental and theoretical data obtained for nanoparticles of the semiconductor Cadmium Sulfide (CdS), in order to contribute for the understanding of their growth dynamics as well as of energetical and structural correlations.

A-O39 SINGLE ELECTRON DEVICES ON NANOCRYSTALLINE SILICON

R. Martins, L. Raniero, I. Ferreira, E. Fortunato - Uninova, Campus FCT, Portugal

The large advances in thin film technology lead today to the production of highly nano-structured silicon thin films where there optoelectronic performances were highly enhanced. In spite of all these developments, the films based on nanocrystalline Si still suffer from presenting a quite low mobility as a result of the role that the amorphous tissue plays. In this paper we present a simulation model that tries to exploit the performances of such material when used to fabricate single electron devices where the device core coincides with a nanocrystalline cluster/island of silicon. By doing so, we can produce devices exhibiting mobility as high as 500 cm²/(Vs) more than 2 orders of magnitude larger than the actual values shown by the bulky material. The theory and the model that supports all this assumptions will be present and discussed.

- A-O40 A MOLECULAR DYNAMICS STUDY OF LIQUID AND AMORPHOUS ZnTe
D.S. Borges, J.P. Rino - UFSCar, CMM(AM), Rodovia Washington Luis, 235 Km (SP-310).

We report molecular dynamics simulations of liquid and amorphous ZnTe at different quench rates. The molecular dynamics simulations were done using both the isenthalpic-isobaric and micro-canonical ensembles. The interaction potential consists of two and three body effective interactions. The two body pair potential takes into account atomic-size effects and charge-charge, charge-dipole, dipole-dipole, and three-body interactions is a modified Stillinger-Weber type potential necessary to consider bond bending and bond stretching covalent effects. The simulation was made with 1000(500 Zn + 500 Te), 8000(4000 Zn + 4000 Te), 27000(13500 Zn + 13500 Te) and 64000(32000 Zn + 32000 Te) particles with the respective sides of the box of simulation, $L = 32.4050$, $L = 64.810$, $L = 97.2150$ and $L = 129.6200$ Å. Structural correlations and the topology of atoms had been investigated through pair distribution function, coordination numbers, ring analyses, factors of structures static and bond angle distribution.

- A-O41 THEORETICAL INVESTIGATION OF IRON DIMERS AND TRIMERS INTERACTING WITH CARBON NANOTUBES

S. B. Fagan - UNIFRA - Centro Universitário Franciscano, Centro de Ciências, CEP: 97010032, Santa Maria-RS; R. Mota - UFSM; A. J. R. da Silva, A. Fazzio- USP.

One of the most promising routes to use carbon nanotubes is to associate single-wall carbon nanotubes (SWNT) with transition metals (TM). Recent experiments of coating SWNT with various alkali and TM atoms have shown that they cover the tube surface in different ways depending of the coating element, for example, Fe atoms have been shown to have a tendency to form clusters whereas Ti atoms form continuous wires. In order to analyze the behavior of the Fe atoms in the tube surface the structural, electronic and magnetic properties of Fe dimers and trimers interacting with a semiconductor (8,0) SWNT are investigated using ab initio spin-polarized calculations. Several configurations of Fe dimers and trimers approaching to the tube wall from outside are studied. For dimers the most stable configurations are with the Fe atoms adsorbed on bond-centered sites at opposite sides of a hexagonal ring, with the Fe-Fe bond aligned in a diagonal direction relative to the tube axis. For trimers, two kinds of Fe structures are investigated: compact or open, and the compact trimers are found to be more stable than the open systems. The resulting magnetic moments for all adsorbed systems are found to be close to their original values for the corresponding free Fe structures. Comparing the present results for dimers and trimers with a previous work of single atoms and wires of Fe interacting with SWNT we observe that the Fe atoms prefer to bind forming more compact structures.

- A-O42 CANCELED

- A-O43 FUNCTIONALIZATION OF CARBON NANOTUBES THROUGH CARBOXYLIC GROUPS
S. B. Fagan - UNIFRA - Centro de Ciências, Centro Universitário Franciscano, Santa Maria-RS, Brazil; M. V. Veloso, A. G. Souza Filho, J. Mendes Filho - UFC.

Carbon nanotubes are promising materials to use in nanoscale devices due to their intriguing physical and chemical properties. The possibility of modifying their properties through functionalization opens up new opportunities for designing new nanotube-based materials as well as functional nanodevices. Sidewall functionalization with direct adsorption of chemical groups (carbines, nitrites, amine groups, etc.) has been proposed. The nanotube electronic properties are affected by attaching molecules to its sidewall and this feature can be exploited for manufacturing selective chemical sensors. In this work we analyze the sidewall functionalization in a semiconductor (8,0) single-wall carbon nanotube (SWNT) through carboxylic group (COOH) by using first-principles calculations based on the density functional theory. We have carried out the calculations by using the SIESTA code that uses localized bases to describe the pseudoatomic orbitals. The resulting interaction between the COOH group and the surface of the SWNT is relatively strong with a binding energy around 1.5 eV. The electronic properties of the original nanotube is modified. The (8,0) SWNT, that originally is semiconductor (gap around 0.6 eV), after the COOH adsorption presents one half-filled level in the gap. We also show that this interaction (SWNT-COOH) could be a possible route to link additional molecules such as NH₂, CO and benzenes through chemical reactions.

- A-O44 MICROSTRUCTURES AND PROPERTIES OF BULK AlFeNd(Cu,Si) ALLOYS, OBTAINED THROUGH CENTRIFUGAL FORCE CASTING
R. A. Mesquita - Villares Metals S.A - Centro de Pesquisas e Desenvolvimento, Rua Alfredo Dumont Villares, 155, Sumaré, Brazil, CEP 13177-900; D. R. Leiva, W. J. Botta Fo. - DEMa, UFSCar; A. R. Yavari - LPTCM-CNRS, INPG – France.

Bulk amorphous or nanostructured alloys have called attention of scientific community, due to the improved mechanical properties attained. In technological application, amorphous and nanostructured Al rich alloys are even more interesting, as they reach exceptional levels of resistance per weight. However, there are no reports of bulk amorphous aluminium rich alloys, being as-cast amorphous specimens limited to hundred microns thick. In this context, many studies have been concerned on the development of fine and metastable microstructures. The main processing route is the warm consolidation of amorphous or fine structured atomised powders. Although many works have succeeded in obtaining dense high strength alloys, the complexity and the elevated number of operations constitute obstacle factors for the technological application of these processes. The present work aimed to study the development of bulk fine structured AlFeNd(Cu,Si) alloys directly from the liquid, using a new centrifugal force casting. The basic details of the device and a first model for the liquid movement are described. Microstructures, hardness and compression tensile strength results are also presented. All results are compared to the same alloys cast through gravity mould casting. The new method promotes finer microstructures and considerably high mechanical properties. The AlFeNd as-cast specimens reach high ductility and strength in the same level of high strength wrought conventional Al alloys.

A-O45 THE ELECTROCATALYTICAL ACTIVITY OF Pt-Rh BILAYER ON THE OXIDATION OF SMALL ORGANIC MOLECULES

M. C. Santos, R. T. S. Oliveira, B. G. Marcussi, L.O. S. Bulhões, E. C. Pereira - LIEC - CMDMC- UFSCAR - Rod. Washington Luiz, Km. 235, CEP 13565-905, São Carlos, SP, Brazil; P. A. P. Nascente - Departamento de Engenharia de Materiais,UFSCAR.

Since the discovery of giant magnetic resistance on metallic multilayers several researchers have investigated the properties of these systems. The thickness and composition of each layer modifies its electronic structure, leading to a completely new material. Although a great effort has been devoted to the investigation of the magnetic (electronic) properties of metallic multilayers, no paper has been published using these systems as electrocatalysts. In this work, it was performed the electrochemical synthesis of a metallic Pt-Rh bilayer on a Pt substrate. First, there was the electrodeposition of Rh (2.3 monolayers) on the Pt substrate. Second, it was electrodeposited Pt (1.7 monolayers) on the Rh previously deposited on the Pt substrate. By X-ray photoelectronic spectroscopy (XPS) it was not detected Rh on the electrode surface. This material was applied in the small organic molecules oxidation: methanol, ethanol, formaldehyde and formic acid using cyclic voltammetry and chronoamperometry. There were increases in the peak current densities about 295, 266, 140 e 380 %, respectively, in comparison with the Pt substrate. An increase in the electrochemical surface area was discarded using the atomic force microscopy data. Thus, the electrocatalytic effect can be associated to the change in the surface energy of the bilayer electrode.

A-O46 METALLIC NANOSTRUCTURE FABRICATION BY AFM LITHOGRAPHY

H. D. Fonseca Filho, C. R. Ponciano, M. H. P. Maurício, R. Prioli - PUC-Rio - Laboratório Van de Graaff, Rua Marques de São Vicente, 225, Rio de Janeiro, Brazil, 38071, Cep 22452-970.

In this work, we have developed a lithography process based on the atomic force microscopy of technique. The study of the lithography process starts with the deposition and characterization of amorphous arsenic sulfide thin films (a-As₂S₃) in silicon substrates and the deposition of a metallic aluminum layer, used as mask, on the surface of the a-As₂S₃. An atomic force microscope was used to write patterns in a controlled way on the metallic layer. Therefore, the influence of microscope feedback system on the accomplishment of the lithography was analyzed. In order to transfer the lithographed pattern to a silicon substrate, the a-As₂S₃ was exposed to a UV light source and was dissolved with a K₂CO₃ solution. Then, a thin gold layer was deposited by sputtering DC, and a new dissolution, now with NaOH was performed, leading to the deposition of Au nanostructures onto the silicon substrate.

POSTER PRESENTATIONS

A-P 001 MICROWAVE-INDUCED COMBUSTION PROCESS OF NANOPOWDER CERAMIC POWDERS

R. H. G. A. Kiminami, M. R. Morelli - UFSCar, Rod. Washington Luis, km 235, São Carlos, SP, Brasil, Caixa Postal 676

The microwave-induced combustion process is an important powder preparation process by which several compounds may be prepared. The process is, in the simplest sense, the exploitation of an exothermic and usually very rapid chemical reaction to produce a useful material. The microwave radiation provides volumetric and selective heating, where heat is generated within the reaction volume itself by the interaction of microwaves with the material. Hence, temperature gradients on microwave heating are the opposite of those in conventional heating, giving the possibility of the developing homogeneous powders characteristics. It is a versatile process to synthesize any kind of single phase, multiphase or composite on a nanophase-scale. This work present aspects of the mechanism that occurs under conditions of the microwave-induced combustion synthesis and examples of powders synthesized by this process.

A-P 002 SYNTHESIS AND MORPHOLOGICAL CHARACTERIZATION OF NANO-FERROELECTRIC FILMS BY CHEMICAL SOLUTION DEPOSITION METHOD

M. T. Escote, F. M. Pontes, V. C. Abarici, G. P. Mambriani, E. R. Leite, E. Longo - UFSCar, Rod. Washington Luiz, km 235 CP 676; J. A. Varela – UNESP

Ferroelectrics thin films have been extensively studied due to their wide range of potential applications in microelectronics, especially in non-volatile memories. With the miniaturization trend in device size, the size dependent evolution of ferroelectricity in nanocrystalline and thin-film samples has been the focus of many research efforts. In this sense, the study of nanodomains films provides a new possibility to perform local studies of ferroelectrics, data storage and new processes to produce these films. In this work, we have produced nanodomain ferroelectric films on a Si(100) substrate by chemical solution deposition method. For this, we have produced a polymeric resin of $ATiO_3$ ($A = Pb, Sr, Ba$) with different metallic concentration. By using a spin coater, these resins were deposited on the substrates and then heat-treated at 700 °C. In order to study the structure and morphological properties, these films were characterized by X-ray diffraction XRD and atomic force microscopy. The XRD patterns revealed that all films are single phase, and the Bragg reflections were identified as belong to the desired phase. The topographic images of these films revealed the presence of nanodots of ferroelectric materials with size ranging from 60 to 150 nm. This work presents an alternative route to produced nanoferroelectric films.

A-P 003

NEW SYNTHETIC ROUTE TO Nb₂O₅ MESOSTRUCTURES

M. A. Bizeto, V. R. L. Constantino - Instituto de Química - Universidade de São Paulo, Av. Lineu Prestes 748, bloco 2 inferior, C.P. 26077, CEP 05513-970, São Paulo – SP, Brasil

Mesoporous solids are an important class of materials in the developing of new multifunctional materials. These solids are obtained by soft-chemical routes based on the supramolecular self-assembly of an inorganic precursor and a template. Transition metal mesoporous oxides are difficult to synthesize due to the high tendency of crystallization that leads to the mesostructure collapse when the template is removed. One successful example of a stable structure is the mesoporous Nb₂O₅, synthesized by the controlled hydrolysis of a niobium alkoxide or chloride using an amine or a non-ionic surfactant as structure directing agent. These inorganic precursors are very reactive and need to be manipulated under controlled humidity conditions. In our studies we developed a new synthetic route based on the hydrolysis of the NH₄[NbO(C₂O₄)₂(H₂O)₂], which is a cheap and easy to handle aqueous soluble niobium precursor. This salt can be obtained directly from the Nb₂O₅, allowing the material to be recyclable. Two synthetic routes were tested, one using n-octylamine (ligand-assisted neutral route) as template and other cetyltrimethylammonium chloride (CTAC) (charge-matching route). In both NaOH was used as mineralization agent. The neutral route produces well ordered hexagonal mesostructures for amine : Nb molar ratios equal to 0.5 : 1 and 1 : 1 while the charge-matching route produces materials with poorer structure order for any CTAC : Nb molar ratio.

A-P 004

ROLE OF MAGNETIC CORRELATION LENGTH IN THE FIELD DEPENDENCE OF THE BLOCKING TEMPERATURE IN DISCONTINUOUS Co/SiO₂ MULTILAYERS

W. C. Nunes, J. C. Denardin, A. L. Blandl, L. Socolovsky, M. Knobel - Unicamp, LMBT, Instituto de Física Gleb Wataghin; C.P. 6165; Campinas- SP 13083-970; L. S. Dorneles, L. F. Schelp - UFSM

A detailed understanding of the effects of interparticle interactions represents one of the most difficult but important tasks of the renewed interest in magnetic nanoparticle systems. The interparticle interactions can provide an extra source of anisotropy, leading to an increase of the blocking temperature. However, the field dependence of the blocking temperature is usually described using noninteracting models that consider single power laws: H_x . In several cases the measurements show deviations from this field dependence. Here, the influence of magnetic interactions on the blocking temperature of Co nanoparticles was studied by means of magnetization measurements on samples of discontinuous Co/SiO₂ multilayers. We describe a generalized phenomenological model which considers a field dependent magnetic correlation length. The model explains the experimental results with accuracy and, in principle, can be used in any nanoparticulate systems. In addition, this study provides a relation between the interaction and an empirical parameter introduced recently to explain the temperature dependence of the coercive field. This work is supported by FAPESP, CAPES, and CNPq.

A-P 005 APPLICATION OF NIOBIUM NANOSTRUCTURED MOLECULAR SIEVE Nb-MCM-41 AS CATALYSTS
Dilson Cardoso, Eliezer Ladeia Gomes – UFSCar, LabCat - Catalysis Laboratory, Chem. Eng. Dept. PO. 676, 13565-905-Sao Carlos, SP, Brazil

Objective. The niobium molecular sieves have been recognized as attractive catalysts in reactions of organic compounds. To study the oxidative nature of these materials, we used the cyclohexene epoxidation with H₂O₂. The sieves were obtained using a new Nb source, the heptafluorniobic acid, which has shown an excellent substitute for the traditional Nb source: the niobium ethoxide. Its advantage lies in handling and low cost, compared to ethoxide. Besides, the industrial process for Nb₂O₅ production used by CBMM (Cia. Brasileira de Metalurgia e Mineração) could be easily modified to heptafluorniobic acid production. Results. The mesoporous sieves gave well-defined XRD patterns of Nb-MCM-41, with a main peak (100) at $2\theta = 2.2^\circ$. As expected, the N₂ adsorption isotherms of these materials were of type IV. It could be observed that with the increase of niobium content in the synthesis mixture, the intensity I₁₀₀ reaches a maximum and then decreases. The same tendency is observed for the hexagonal arrangement parameter, a_h, pore diameter, PD and total porous volume, V_t and wall thickness, w. However, there is a decrease in the surface area, S_{N₂}. The UV-vis spectra of the samples show bands at 210 and 245 nm, attributed to a ligand-metal charge transfer, where Nb is tetrahedral coordinated and interact with H₂O molecules forming distorted environment. In general, the epoxidation of cyclohexene by Nb-MCM-41 catalysts increases with Nb content but the selectivity to epoxide decreases.

A-P 006 COLLOIDAL CDS NANOPARTICLES: HIGHLY FLUORESCENT AND STABLE LABELS FOR RED BLOOD CELLS
C. L. César, A. Fontes – Departamento de Eletrônica Quântica- Instituto de Física Gleb Wataghin-UNICAMP- Cidade Universitária- Campinas- SP- Brazil; P. M. de Farias, B. S. Santos, F. D. de Menezes, R. Ferreira - UFPE; M. L. Barjas-Castro, V. Castro, P. R. M. Lima - HEMOCENTRO-UNICAMP

Size similarities between nanoparticles and biomolecules combined to the possibility of tuning semiconductor nanoparticles optical properties, gave rise to a new class of fluorescent labels. Their first biological applications appeared in 1998. When compared with conventional coloring agents such as rhodamine 6G or other organic dyes, the semiconductor nanoparticles produce narrower and much brighter fluorescence spectra. The particles can be synthesized inexpensively, in custom form, and in large quantity. And although the signal from organic dyes grows dim quickly under prolonged illumination, the semiconductor particles keep on shining-in some cases 100 times longer than dye molecules. In this work we report a new and efficient methodology of red blood cell labeling employing luminescent semiconductor nanocrystals. Highly luminescent and stable cadmium sulfide colloidal particles were obtained in the nanometer size range. Their surface was functionalized with monoclonal anti-A via an one-pot glutaraldehyde cross linking procedure, followed by their conjugation to red cells of blood groups A, A₂ and O. Confocal microscopy images show that after 30 minutes conjugation time, the type A erythrocytes presented dual bright emission whereas the O group cells showed no emission. We suggest that this new efficient and simple labeling procedure may be employed as a quantitative tool to investigate the distribution and expression of alloantigens in red blood cells.

- A-P 007 PREPARATION AND CHARACTERIZATION OF NANOCOMPOSITES OF PVDF/CaCO₃
C. X. Cardoso, M. A. L. Nobre - Unesp, Departamento de Física, Química e Biologia, Faculdade de Ciências e Tecnologia, Rua Roberto Simonsen, 305, Presidente Prudente, São Paulo, Brazil, Caixa Postal 457, CEP. 19060-900; A. A. Ribeiro, J. S. C. Campos - Unicamp

The contribution of new materials to wide range areas of applied science involving composites and blends has reaching multidisciplinary events from technological and scientific viewpoint. This approach has been motivated by the crescent requirements of applications involving the medicine. In this sense, this work presents the preparation and characterization of composites of poly(vinylidene fluoride) (PVDF) and calcium carbonate (CaCO₃) with objective of analyze the effect of the incorporation of CaCO₃ in the PVDF on the improvement of the PVDF mechanic resistance. These materials exhibit potential application in the implant area for bone restoration and supplement. Films of PVDF/CaCO₃ composites were prepared by casting method. Both PVDF and CaCO₃ were dissolved in the dimetilacetamyde (DMA). In the sequence, proper amount of the PVDF emulsion and CaCO₃ suspension were mixed in several ratios (weight percent: 100/00, 95/05, 85/15 70/30). All mixture was dry in glouve box. Homogeneous films were prepared. The one were characterized using the infrared spectroscopy, thermal analyses, X-ray diffraction, optic microscopy and scanning electronic microscopy. Data analysis shows that the material is a composite with good thermal stability up to the 400 °C. The incorporation of carbonate increases mechanical properties. The PVDF/CaCO₃ composite exhibiting ratio of 85/15 wt% presents the best strength response.

- A-P 008 NANO-STRUCTURATION OF DLC FILMS DEPOSITED BY HIGH DENSITY PLASMA CHEMICAL VAPOR DEPOSITION
A. P. Mousinho, R. D. Mansano - LSI/ EP - USP, av. Prof. Luciano Gualberto, 158, trav.3, Cep: 05508-900, Universidade de São Paulo, São Paulo-SP, Brazil

In this work, we study the influence of the surface topography in the nano-structuration of the DLC films deposited by HDPCVD (High Density Plasma Chemical Vapor Deposition). The DLC deposition processes were performed in a plasma system with RF inductively coupling, the base pressure was 3 micro Torr, the process pressure was 15 mTorr and the RF was 250 W. For DLC deposition was used pure methane plasmas and various surface topographies generated in silicon wafers by reactive ion etching, wet chemical etching and powder dispersion (diamond and graphite powder). The roughness of the surface substrate and deposited layer was observed by Atomic Force Microscope and Scanning Electronic Microscope. The hybridization of the DLC films were analyzed by Raman Spectroscopy. Using an HDPCVD system, the roughness of the deposited DLC films depends on the type of roughness of the silicon surface wafers and powder dispersion. It is possible to observe that the DLC film surface within the etched structure is rather rough. If the surface of the sample was rough, the structures created by dry etching and structures created by wet isotropic etching; then this roughness promoted texturization and grain formation. These phenomena can be explained by the fact that the locally higher surface energy of the rough surface and sharp edges can induce local defects in the film. As mentioned above, smooth films could be deposited on top of a smooth silicon wafer and the step coverage was very good.

- A-P 009 PHOTOELECTRIC EFFECTS OF NANOSTRUCTURED AMORPHOUS CARBON FILMS
R. D. Mansano, M. S. DeMedeiros, A. P. Mousinho - LSI-PSI-EPUSP, Laboratório de Sistemas Integráveis da Escola Politécnica da Universidade de São Paulo, Av. Prof. Luciano Gualberto, 158, São Paulo, São Paulo, Brazil, 05508-900

In this work we study the photoelectric properties of nanostructured amorphous hydrogenated carbon films, these films are a variation of diamond-like carbon films. For this study we deposit carbon films with different compositions and was analyzed their electrical and optical proprieties. These films were deposited by reactive magnetron sputtering using a pure graphite target and methane, nitrogen, carbon tetrafluorine and argon which processing gases. The amorphous carbon films are naturally nanoestructurated and shows amount of optical proprieties as photoemission in the visible range and photoelectric effects. For enhance these effects in this work we promote the selective etching of the carbon films, and we obtained a nanopores and nanoholes. These defects show characteristics of potential gaps and modify the carbon films properties. Plasma etching performed the generation of the nanopores and nanoholes in the carbon films. The characteristics of these films is realized by photoluminescence analyze, optical absorbance, optical conductivity and Fourier Transformed InfraRed Spectroscopy (FTIR). In this study was necessary the development of the new structure for optical analyses of the nanoporous carbon films. For this we develop an auto-aligned test structure based in inter digital electrodes. The electrodes were used which mask for the definition of the areas for the plasma etching and nano-structuration of the carbon films.

- A-P 010 PORE-SIZE DISTRIBUTION ON SiO₂-COATED Ni NANOSTRUCTURED COMPOSITE OBTAINED BY THE POLYMERIC PRECURSOR METHOD
A. A. CAVALHEIRO, E. R. LEITE - UFSCar, LIEC - Rodovia Washington Luis SP310, Km235, CEP13560-905 - São Carlos, SP, Brazil; J. C. BRUNO, J. A. VARELA - UNESP

Mesoporous materials were investigated for use in catalysis, sorption and separation processes due its high application potentials. Improving many aspects of the metal-ceramic composite, the transition metal nanoparticles must be adequately dispersed on a matrix, which direct processes like the polymeric precursor method can reaches more effectively. The goal of this work is to investigate the pore formation in the SiO₂-Ni nanocomposite and how the pore size distribution and Ni nanoparticles nucleation in the matrix composite are changed with polymer type and time of pyrolysis. Ni:SiO₂ nanocomposites samples were synthesized by using tetraethoxysilane, citric acid, and nickel (II) nitrate hexahydrate. After polymerizing reaction using two types of polioliol, with ethylene glycol and glycerol the polymeric resin was heat treatment at 250°C for 2 hours in a mufle type oven, and in sequence, the resulting precursor was ground in a mortar and pyrolyzed at 600°C for 7 hours in a tubular furnace with a N₂ atmosphere. By combining thermogravimetric and nitrogen adsorption/desorption analyses, the pore-size distribution could be investigated. The main difference in polymerization process occurs as function of polioliol-citrate connectivity. Three hydroxyls groups, when the glycerol is used as polymerizing agent makes the polyester chain more interlaced, changing the pyrolysis process. The pores are time-dependently enlarged to mesopores, but this process is dependent of polioliol nature.

A-P 011 MAGNETIC-FIELD EFFECTS ON QUASI-TWO-DIMENSIONAL EXCITONS IN SEMICONDUCTOR NANOSTRUCTURES

E. Reyes-Gómez - Dept. of Theoretical Physics, University of Habana, San Lázaro y L, Vedado 10400, Habana, Cuba; L. E. Oliveira - Instituto de Física, UNICAMP, CP 6165, Campinas, São Paulo 13083-970, Brazil; M. de Dios-Leyva - Dept. of Theoretical Physics, University of Habana.

Within the variational procedure in the effective-mass and non-degenerate parabolic-band approximations, the effects of a magnetic field on the exciton effective mass and dispersion in semiconductor nanostructures are investigated. Calculations are performed for three-dimensional, two-dimensional and quasi-two-dimensional excitons in coupled quantum wells for applied magnetic fields perpendicular to the layers. An analytical expression for the exciton effective mass as function of the applied magnetic field is also obtained. Present results lead to a magnetic-field dependent exciton effective mass and dispersion in quite good agreement with available magneto-optical measurements in semiconductor nanostructures.

A-P 012 LOW TEMPERATURE SYNTHESIS OF ANATASE TiO₂ NANOPARTICLES FROM Ti-PEROXY COMPOUND ALCOHOLIC SOLUTION

C. Vila, E.R. Leite, E. Longo - UFSCar, Rod. Washington Luis, Km 235, São Carlos, SP, Brasil, CEP 13565-905, L.G. P. Simões - Unesp

Titanium dioxide (TiO₂) is an n-type oxide semiconductor that shows great photocatalytic activity and photoconductivity. These properties are mainly influenced by particle size. It means that TiO₂ in nanometric scale can enhance the catalytic activity, since the optical band gap is widened due to the quantum size effect combined with the increased surface area. Much work has been reported on preparing anatase TiO₂ nanoparticles. However, most of them have several practical disadvantages, such as expensive raw materials, high loss weight, high crystallization temperature. Therefore, it is important to develop new routes, in which we can improve the material properties and lower the costs. In this work, we have produced nanosized titania by a very simple, carbon-free, effective method. Ti-peroxy compound was synthesized from titanium isopropoxide (Ti(O-iPr)₄) and hydrogen peroxide (H₂O₂). Anatase titania nanoparticles were produced by decomposing this Ti-peroxy compound diluted in isopropyl alcohol at 343K for 20h using a reflux apparatus. The material was characterized by DSC, XRD, Raman, N₂ adsorption isotherm and TEM.

A-P 013

LUMINESCENCE IN PbTiO₃: Er³⁺/Yb³⁺ NANOCRYSTALLINE CERAMICS

J. E. C. da Silva - Campus de Araguaína, Universidade Federal do Tocantins, Rua Humberto Campos, 508, C.P.: 77807-060, Araguaína-TO, Brasil; F. C. D. Lemos, D. M. A. Melo, A. O. da Silva - Departamento de Química, UFRN; S. Alves Jr. - Departamento de Química Fundamental, UFPE.

Er³⁺/Yb³⁺ modified lead titanate ceramics (PbTiO₃: Er³⁺/Yb³⁺) were prepared by the Pechini method. The materials were calcinated under flowing oxygen at different temperatures from 300 to 700 °C. Nanostructured PbTiO₃: Er³⁺/Yb³⁺ was obtained by high-energy milling and investigated using X-ray diffraction (XRD), thermogravimetric analysis (TGA), differential thermal analysis (DTA), transmission electron microscopy (TEM), scanning electron microscopy (SEM) and surface area analysis (BET). The luminescence properties of nanocrystalline ceramics will be reported. The process is observed under 980 nm laser diode (GaAs:Si) and 488 nm (Ar CW laser) excitation and results in the generation of green (~555 nm) and red (~655 nm) emission. The mechanisms of the excitation are discussed. The power up-conversion efficiency for red emission is predominant in this material, while in the down-conversion process the green emission prevails.

A-P 014

MANIPULATION OF NANO-OBJECTS IN SITU IN A FEG-SEM

D. Nakabayashi, D. Ugarte - LNLS/IFGW-UNICAMP, Laboratório Nacional de Luz Síncrotron - LNLS, Caixa Postal 6192, CEP 13084-971, Campinas, SP, Brazil; P. C. Silva - LNLS; J. C. González - DF-ICEX-UFMG/LNLS

There is a huge interest in the study and application of nanometric systems because they show new physics, chemical, etc. properties. The technological use of nano-objects (particles, wires, tubes, etc.) is seriously limited to the fact that conventional tools, even microscopic, can not be easily applied in the nanometer size range. Further developments in this field require new instruments to characterize and move these tiny objects. In this work, we describe the design and construction of a manipulation system allowing nanometric objects motion and operating inside a scanning electron microscope. The nanomanipulator movements are based in picomotors (coarse displacements) and piezoelectric slabs
Oscar Loureiro Malta (UFPE)

CONTROLLING NANOPARTICLE PROPERTIES BY COLips based in carbon nanotubes and, also the measurements of mechanical properties of unidimensional nano-objects, such as InP nanowires (100-400 nm in diam., 10 microns in length) and, multiwalled carbon nanotubes. Using our system, we have also manipulated InP nanowires, which were arranged into a predefined configuration or precisely positioned between Au contacts. This last procedure represents a fundamental step required for a construction of electronic nanocircuits based on the bottom-up approach.

A-P 015

NITROGEN INCORPORATION INTO AMORPHOUS FLUORINATED CARBON FILMS

C.M.T. Sanchez, M.E.H.M. da Costa, F.L. Freire Jr. - PUC-Rio, Departamento de Física, Rua Marques de Sao Vicente 225, Rio de Janeiro, Brazil, P.O.Box 38071

The properties of amorphous carbon hydrogenated films (a-C:H); make these materials good candidates to be used for surface coating of electromechanical nanodevices. The properties of a-C:H films can be improved to the desired application by incorporating other elements during the film deposition. The structural, mechanical, tribological, electrical, and optical properties were changed by nitrogen incorporation in a-C:H films [1]. The changes of the electric properties of a-C:H induced by fluorine incorporation were the main reason for its study. In this work, we will present a mechanical, tribological, and structural study of the effect the incorporation of N into a-C:F:H films deposited by PECVD using CH₄-CF₄-N₂ mixtures as precursor atmosphere. the effects of N in the plasma mixture were investigated in the range of N partial pressure from 0 to 50%. The self-bias voltage, V_b, was ranged from -100V to -600V. A mixture of CH₄ and CF₄ in the proportion 1:2 was used as a precursor. The chemical composition was obtained by using the combination of Rutherford backscattering spectrometry (RBS) and elastic recoil detection analysis (ERDA) measurements. X ray photoelectron spectroscopy (XPS) and micro-Raman technique were used to determine the chemical environment and film microstructure, respectively. Hardness measurements were performed with a Nanoindenter II from NanoInstruments with a maximum load of 20 mN. Friction measurements were carried out using a Nanoscope III AFM.

A-P 016 NANOSTRUCTURED TiO₂ THIN FILMS BY POLYMERIC PRECURSOR METHOD
D. G. Stroppa, T. R. Giralardi, E. R. Leite, E. Longo - UFSCar, CMDMC-LIEC, Rod. Washington Luiz, km 235, São Carlos, Brazil, Caixa Postal 147

Nanostructured anatase TiO₂ has been studied for its potential applications in DNSCs (dye-sensitized nanocrystalline solar cell). For these purposes, it is interesting to obtain nanostructured TiO₂ thin films by a simple, effective and low cost method. In this work, we obtained TiO₂ thin films by the polymeric precursor method, using different processing routes. The effect of the precursor stoichiometry, solid concentration and deposition rotation speed in the film characteristics were studied. The crystalline phases in the films were verified by XRD and the structural characteristics, such as grain size, were performed by AFM. The packing factor and the film thickness were analyzed by ellipsometry. By fixing the citric acid:titanium ratio in 3:1, and varying the remaining parameters, thin films with thicknesses between 19 and 45 nm were obtained. On the other hand when the precursors ratio was fixed in 2:1, the range of thicknesses obtained varied from 77 to 128 nm. It was verified that all samples consist of the anatase phase. The AFM characterization results indicate that all films present a mean grain size of 17 nm, and a mean roughness of 0.8 nm. Based in these results, we concluded that it is possible to obtain a good control of the thickness and morphology of the thin films, with a simple and low cost method of deposition.

A-P 017 A.C. CONDUCTIVITY STUDIES OF NANOCOMPOSITE SINGLE ION CONDUCTOR FOR APPLICATION IN LITHIUM-ION DEVICES
F. L. de Souza, E. Longo, E. R. Leite - UFSCar, CMDMC-LIEC, Via Washington Luiz km 235, São Carlos-São Paulo, C.Postal 676.

The nanocomposite single ion conductor studied here is prepared with citric acid, tetraethyl orthosilicate and ethylene glycol, forming polyester chains. The nanocomposite is shown to be fully amorphous at room temperature with the vitreous transition temperature at around 228K (-45°C). The contribution of charge carrier concentration and ion mobility to the dc ionic conductivity of these nanocomposite electrolytes is discussed. The effects of the Li concentration and also the concentration of SiO₂ nanoparticles are investigated in terms of the ionic conductivity. The frequency dependence of the ionic conductivity can be usually well described by using Jonscher's expression $s(\omega) = s(0) + A(\omega)^n$. The carrier hopping rate, ω_p , is obtained from the following expression $s(0) = A(\omega_p)^n$. The values of activation energy obtained for $s(0)$ and ω_p in function of the temperature it was approximately the same indicating that the dispersive conductivity, $s(\omega)$, originates from the migration of ions. It is possible, of those results, to distinguish between conductors in which the mobile ion concentration is thermally activated and those for which it is temperature independent.

A-P 018 NANOMETER-SIZED PIGMENTS OF NICKEL-DOPED ALUMINA
R. C. Lima, E. Longo, E. R. Leite - UFSCar Departamento de Química/ CMDMC - LIEC, UFSCar, Rod. Washington Luiz, Km 235, São Carlos/SP, Brazil, Caixa Postal 676, CEP 13565-905

Nanosized nickel-alumina pigments were prepared by the polymeric precursor method, which is based on Pechini process. The pigments containing different concentrations (1.0, 1.2, 1.4, 1.6, 1.8 and 2.0 mol% of Ni) were heat treated between 700 and 1100 °C in air. By X-ray diffraction, it was possible to identify the crystalline phases formed after treatment. The material treated at 900°C presented only gamma-Al₂O₃, whereas the sample calcinated at 1100°C showed peaks characteristic of alpha-Al₂O₃. The gamma-Al₂O₃ has a cubic structure of spinel type with a specific population of Al³⁺ defects in both tetrahedral and octahedral sites. FTIR spectra of the material treated at 900°C presented bands corresponding to tetrahedrally and octahedrally coordinated Al ions. In addition, this samples presented of nanoparticles (around 10 nm) confirmed by TEM images. The pigments showed different colors depending on the crystalline phase present. This occurs because Ni occupies different positions in alumina matrix. A detailed study of the colors of the pigments was accomplished using the CIELab method.

A-P 019 LAYER-BY-LAYER FILMS OF POLY(O-ETHOXYANILINE) DOPED WITH DIFFERENT ACIDS

E. D. Brugnollo, H. H. Takeda, L. G. Paterno and L.H.C. Mattoso - Embrapa Instrumentação Agropecuária, 1.452, Rua XV de Novembro, São Carlos, Brazil, CEP 13560-970

Thin films containing layers of conducting poly(o-ethoxyaniline) POEA alternated with sulfonated poly(styrene) PSS were fabricated by the layer-by-layer method and the effect of different dopant acids on the amount of polymers adsorbed was evaluated by UV-Vis spectroscopy. The electrical properties of films containing 5 bilayers of POEA/PSS were characterized by AC impedance measurements. For that all different films were deposited onto gold interdigitated microelectrodes. UV-Vis data have shown that the amount of POEA on the POEA/PSS films increases linearly with the number of layers deposited independently on the type of dopant acid used in the polymeric solution. In other words, each layer deposited has contributed with the same amount of polymeric material but this amount was found to be strongly dependent on the type of dopant used. From the impedance measurements it has been observed that films containing different dopants have exhibited distinct electrical responses when immersed in a same kind of liquid. Preliminary data have demonstrated the possibility of using such different POEA/PSS films as sensing parts in a gustatory sensor system.

A-P 020 MAGNETIC AND TRANSPORT PROPERTIES OF NANOSCALED Fe₃O₄ FILMS

E. Lima Jr., W. L. Martins Filho, T. S. Berquó, G. F. Goya - LMM-USP, Laboratório de materiais magnéticos, Instituto de Física, Rua do Matão, travessa F, sn, São Paulo, Brazil; V. Sivakov, S. Hão, S. Mathur - INM

We have investigated the magnetic and transport properties of nanoscaled magnetite (Fe₃O₄) films deposited in a cold-wall CVD reactor using iron alkoxide precursors as a single-source for Fe²⁺, Fe³⁺ and O²⁻ ions. In total of 9 samples were produced in different synthesis conditions. The series was composed of 3 sets of films deposited on MgO (001), MgAl₂O₄ (001) and Al₂O₃ (0001) and obtained from different precursors and conditions. The structural properties of the samples were analyzed by XPS, XRD and RBS. Resistivity measurements using a four-probe method indicated semiconducting behavior above and below T_V, following a thermally activated regime with activation energies U ~ 67-80 meV. The magnetoresistance, MR = [R(H)-R(0)] / R(0), for in-plane and out-of-plane configurations display approximately linear H dependence in the high-field region, but in the low-field region the in-plane curve presents a linear behavior while a quadratic tendency was observed for out-of-plane curve. We obtained a value MR 3.6 % under a 20 kOe field at 300 K.

A-P 021 PHOTOLUMINESCENCE IN AMORPHOUS Ba_xSr_{1-x}Ti_{1-y}Sn_yO₃

I. A. Souza, M.S.Góes, L.G.P. Simões, A.B. Campos, C.O. Paiva-Santos, M. Cilense - IQ-UNESP, Laboratório Interdisciplinar e Cerâmica, Rua Prof. Francisco Degni, s/n, 14801-970, Araraquara, Brazil, Caixa Postal 355; E. Longo, L.P.S. Santos, M.F.C. Gurgel - DQ-UFSCar

Photoluminescence at room temperature was observed in amorphous Ba_xSr_{1-x}Ti_{1-y}Sn_yO₃ (x = 0.5 and y = 0.5; 0.10 e 0.20) obtained from the polymeric precursor method. Our investigation of the electronic structure involved the use of first-principle molecular calculations to simulate the variation of the electronic structure in the BST crystalline phase, which is known to have a direct band gap, and we also made an in-depth examination of amorphous BST:(Sn). The results of our theoretical calculations of amorphous calcium titanate indicate that the formation of fivefold coordination in the amorphous system may introduce delocalized electronic levels in the highest occupied and the lowest unoccupied molecular orbitals. These delocalized electronic levels are related to the formation of a tail in the absorbance spectrum curve. Experimental optical absorption measurements showed the presence of a tail. These results are interpreted by the nature of these exponential optical edges and tails, associated with defects promoted by the disordered structure of the amorphous material.

A-P 022 OPTICAL AND MORPHOLOGICAL STUDIES IN NANOSTRUCTURED SILICA GEL/CONJUGATED POLYMER COMPOSITES

G. A. M. Safar, L. R. A. Garcia, F. S. Lameiras - CDTN/CNEN Centro de Desenvolvimento de Tecnologia Nuclear, Comissão Nacional de Energia Nuclear, Rua Prof. Mário Werneck, s/n, Belo Horizonte, Minas Gerais, Brazil, Caixa Postal 941 - CEP 30123-970; F.A.C. de Oliveira, L. A. Cury - UFMG

Photoluminescence spectra of poly[2-methoxy-5-(2'-ethyl-hexyloxy)-1,4-phenylene vinylene] (MEH-PPV) encapsulated in nanostructured silica shells were measured after freeze-drying and heat-drying in vacuum. Scanning electron microscopies (SEM) of freeze-dried samples deposited in metal substrates and suspension in water shows typical clay-like material behavior. Leaching of MEH-PPV from the silica nanoshells in chloroform in both samples is observed. Compared to the freeze-drying process, the heat-drying in vacuum diminished the leaching of MEH-PPV from the silica. Similar photoluminescence spectra at room temperature for the heat- and freeze-dried samples have been observed. A linear behavior of the emitted light with increasing laser intensity was observed in both cases, with a larger tendency of saturation for the heat-dried sample. The spectra of both composites present a shoulder at wavelengths lower than the purely electronic transition peak, which is not observed in standard cast films of MEH-PPV. The presence of this shoulder is not completely understood but is probably related to the emission process from molecular segments of the conjugated polymer with lower conjugation lengths. The shoulder intensity saturates while the purely electronic transition peak continues to enhance with increasing laser intensity. This is best observed in the spectra of the freeze-dried sample with the nanostructured silica shells dispersed in water.

A-P 023 INFLUENCE OF Al₂O₃ NANOCOATING ON SINTERING OF ZrO₂ NANOPARTICLES

R.F. Gonçalves, J.A. Varela, E.R. Leite, E. Longo - LIEC-UFSCar, Laboratório LIEC, Rod. Washington Luís, Km 235

In order to produce dense and monometric ZrO₂, we have studied methods to control the surface matter transport during the sintering of this oxide. For this, we have analysed the influence of Al₂O₃ coating on the physical properties of the core and the chemical properties of the surface of the nanoencapsulated ZrO₂. Such Al₂O₃ coating was deposited on the ZrO₂ by the polymeric precursors method and the obtained powders were sintered in a furnace with constant heating rate and controlled atmospheres. Pure and coated ZrO₂ powders were also pressed into pellets and analysed by dilatometry. It has been found that alumina considerably retards the sintering of the doped zirconia. Sintered samples were characterized by X-ray diffraction (DRX), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The density of the obtained materials was measured by the Archimedes method.

A-P 024 SOL-GEL LIKE METHOD FOR OBTAINING OF ALUMINA NANOCOATED WITH RARE-EARTH

A. P. Maciel, J. A. Varela - UNESP, LIEC/Rua Francisco Degni, s/n Bairro Quitandinha, Araraquara-SP, Cep:14800-900, Brasil; E. R. Leite, E. Longo - UFSCAR

In this work, alpha-alumina powder was nanocoated with lanthanum oxide by sol-gel like method. Lanthanum polymeric precursor was used to coat the alpha-Al₂O₃ dispersed in water. The influence of the lanthanum oxide nanocoating on the sintering and microstructure of alpha-alumina was investigated using electron microscopy techniques. Scanning electron microscopy (SEM) of these nanocoated grains revealed that the lanthanum oxide precipitates on the grain boundary of the alpha-alumina, at high temperature. High-resolution electron microscopy (HREM) observations clearly showed the formation of a La₂O₃ layer on the surface of the alpha-alumina. The La₂O₃ layer modified the sintering process of the pure alumina. At high temperatures significant modifications on the grain morphology and microstructure was observed. It was verified that amorphous La₂O₃ layer react with alpha-alumina grain, resulting in LaAlO₃ increasing the sintering temperature. La₂Al₂₄O_{39,6} phase was observed.

A-P 025

DEVELOPMENT OF THE NANOSTRUCTURED WO₃ THIN FILMS

T. R. Giraldi, E. R. Leite, E. Longo, J. A. Varela - UFSCar, Rod. Washington Luz, km 235, São Carlos, Brazil, Caixa Postal 147

Nanoscaled materials are emerging as an interesting alternative to obtain Li⁺ electrochromic windows with improved properties, such as the rate capability of ionic transport. Usually, the macrohomogeneous approach is used to study the electronic and ionic transports in complex configurations. However, this model is not directly applicable to nanometric materials. Recently, a model for ionic transport in nanostructured Li⁺ insertion electrodes, known as the “nanoscale effect”, was proposed. WO₃ is by far the most extensively studied electroinsertion material for electrochromic devices. However, this material usually presents mean grain size of approximately 200 nm. In order to apply the “nanoscale effect” model in WO₃ thin films, the preparation of nanostructured WO₃ thin films by the polymeric precursor method was investigated. Different compositions were studied, among them, pure WO₃, WO₃:Ti and WO₃:Nb. After the optimization of the solution composition, thin films were obtained. These films were deposited onto quartz substrates by spin coating, and treated at 450°C. The thin films were characterized by the XRD and AFM. The results indicate that 5mol%Nb-doped WO₃ thin films presented a strong decrease in the mean grain size, when compared to pure WO₃. This initial study showed that it is possible to prepare single-phased WO₃ thin films with nanometric grains. In addition, further studies will be done regarding the intercalation process, to apply the “nanoscale effect” model.

A-P 026

WET-CHEMICAL SYNTHESIS OF MAGNESIUM NIOBATE NANOPARTICLES POWDERS

L.P.S. Santos, E.R. Camargo, E. Longo, E.R. Leite - UFSCar, Rod. Washington Luis, km 235, CEP: 13565-905, São Carlos - SP, Brasil

Magnesium niobate (MgNb₂O₆) powders in orthorhombic form were synthesized by a wet-chemical method by means of the dissolution of Nb₂O₅.5H₂O and magnesium carbonate in a solution of oxalic acid. The powders were calcined in the range of temperatures from 200 to 900 °C for 2h. The formation mechanism of columbite MgNb₂O₆ was clarified by TG-DSC analysis, FT-Raman spectroscopy and X-ray diffraction (XRD). The morphology of the formed powders were examined by scanning electron microscopy (SEM). Pure MgNb₂O₆, free from second phases as obtained at 800 °C, was confirmed by a combined analysis using XRD and FT-Raman. The average diameter of the particles was calculated from SEM image as 100 nm. This technique allowed a better mixing of the constituent elements at atomic level and thus a better reactivity of the mixture to obtain pre-reaction products with high purity at lower temperatures and reducing cost. It can offer a great advantage in the PMN-PT formation with respect to the solid-state synthesis.

- A-P 027 STRUCTURAL AND DYNAMIC PROPERTIES OF GRANULAR CO MULTILAYERS
J. C. Denardin, M. Knobel, F. Cebollada - UNICAMP, Instituto de Física Gleb Wataghin (IFGW),
Universidade Estadual de Campinas (UNICAMP), C.P. 6165, Campinas S.P., Brazil; L.S. Dorneles,
L.F. Schelp – UFSM; L. Spinu - AMRI

The synthesis of magnetic nanoparticle systems with controlled morphology is very important view their interest for device and storage information applications. In order to study the influence of the microstructure on the magnetic properties of these granular materials, we have used an alternative method to fabricate magnetic nanoparticles, using sequential deposition. In contrast to the co-deposition, this method allow a better control of the size and distance between clusters by varying the thickness of the layers, obtaining samples with tuned strength of interactions. Analysis by Transmission Electron Microscopy images of our samples produced by sequential deposition revealed periodically arranged Co nanoparticles with about 3 nm in diameter and very narrow dispersion of sizes. Radio frequency transverse susceptibility experiments at various temperatures, ac susceptibility in a wide frequency range (10 Hz, 10 kHz) and various field and temperature dependent magnetization processes were used in order to investigate dynamics in Co nanoparticle systems. The frequency variation of the blocking temperature has been analyzed for a series of samples with similar volume distribution and interparticle interactions of different strengths. It is shown that the combined effect of magnetic relaxation and interactions is fundamental in defining the overall magnetic properties of magnetic nanoparticle systems.

- A-P 028 SYNTHESIS OF THE CUBIC BISMUTH ZINC NIOBATE PYROCHLORE (Bi_{1,5}ZnNb_{1,5}O₇)
BY THE POLYMERIC PRECURSOR METHOD
S. A. Silva, G. P. Thim, S. M. Zanetti - ITA, Pça. Mal. Eduardo Gomes, 50, Vila das Acácias, São José dos Campos/SP

Cubic bismuth zinc Niobate pyrochlore (Bi_{1,5}ZnNb_{1,5}O₇) nanopowder was synthesized by an urea modified polymeric precursor method. The powder was obtained after pre-treatment at 350°C and 400°C for 4h followed by thermal treatment at different temperatures (500, 600 e 700°C) for 2h. DSC result shows that the cubic pyrochlore phase crystallizes at temperatures as low as 480°C. The crystallization process was followed by DRX which revealed that -BZN crystallizes directly from the amorphous powder with no intermediate or secondary phases. The particles morphology and size were examined by SEM and TEM.

A-P 029 STUDY OF THE STRUCTURAL AND ELECTRIC PROPERTIES OF THIN FILMS OF PZT DOPED WITH Ca, Sr AND Ba

C.E.F. Costa, M. R. C. Santos, L. E. B. Soledade, I. M. G. Santos, A. G. Souza - UFPB, LTM, Departamento de Química, CCEN, Universidade Federal da Paraíba, Campus I, CEP 58059-900, João Pessoa, PB, Brasil; F.M. Pontes, P.S. Pizani, J. A. Varela, E. R. Leite, E. Longo - CMDMC - LIEC - DQ - UFSCar

The applications of thin films with ferroelectric properties, in the field of microelectronics, has been remarkably increasing. The oxides based on Pb, ZrTiO₃, PZT, with perovskite structure have received a special attention special, due to their applications DRAM or NVFRAM-type memories PZT can undergo structural modifications to yield powders displaying ferroelectric or pyroelectric properties. Current studies indicate that it is possible to exchange other ions for lead or titanium in the lattice sites. In this work was carried out the microstructural characterization and the study of the electric properties of Pb_{0.7}X_{0.3}Zr_{0.3}Ti_{0.7}O₃ (x=Ca, Sr and Ba) thin films produced by the polymeric precursor method. The films were deposited on the substrates by spin-coating. The techniques of XRD and Raman spectroscopy were employed for the characterization. The dielectric properties and the capacitance/voltage curves of the PZT thin films were measured according to the metal/ferroelectric/metal configuration (MFM) with the help of an HP4192A impedance analyzer. For the hysteresis measurements, the model RT6000HVS Radiant Technology equipment was used. All the tests were performed at room temperature. By means of XRD, it was observed that all the films are single-phase systems, with a perovskite-type structure. In all the films it was noticed a ferroelectric behavior and a variation in the PZT dielectric constant as a function of the replacement of Pb⁴⁺ by Ca²⁺, Sr²⁺ and Ba²⁺.

A-P 030 PHOTOLUMINESCENCE OF DISORDERED CaWO₄ PREPARED BY A CHEMICAL ROUTE

M. A. M. A Maurera, A. G. Souza - UFPB, Laboratório de Termoquímica e Materiais, DQ/CCEN/UFPB - Cidade Universitária, João Pessoa, Brasil; F. M. Pontes, E. Longo, M. A. dos Santos, E. R. Leite, E. Orhan, P. S Pizani – UFSCar; J. Andres - Universitat Jaume I

Polycrystalline CaWO₄ thin films having tetragonal scheelite structure were prepared by the polymeric precursor method. The thin films were deposited on substrates of silicon coated platinum and quartz by means of the spinning technique and were heat treated at different temperatures from 573K to 873K for 4h. The surface morphology and crystal structure of the films were investigated using grazing incident X-Ray diffraction (GIXRD), scanning electron microscopy (SEM) and atomic force microscopy (AFM). GIXRD data showed that CaWO₄ phase crystallizes at 600°C from of inorganic amorphous matrix. Atomic force microscopy (AFM) was used to obtain a 3D image reconstruction of the sample surface. These images allow for an accurate analysis of the sample surface and quantification of roughness and grain size. The spectral dependence of optical absorbance for the crystalline and amorphous CaWO₄ thin films was measured. It was found that CaWO₄ have an E_{gap} = 5.27eV, of a direct transition nature. The PL spectra of the films excited by the 488 nm line of an argon ion laser, measured at room temperature, showed an emission band typical of a multiphonon process, i.e. a system in which relaxation occurs by various paths, involving the participation of numerous states. The spectra general aspect is a broad band covering a large part of the visible spectra. That band can be decomposed into three components: three broad bands at approximately 530nm (green), 580nm (yellow) and 650nm (red).

A-P 031 PREPARATION OF PE/ORGANOCLAY (NANO)COMPOSITES OBTAINED BY MELT INTERCALATION METHOD

E.M. Araújo, R. Barbosa, A.D. Oliveira, T.J.A. Melo, R.R. de Lima - UFCG, DEMa/CCT/UFCG, Av. Aprígio Veloso, 882, Campina Grande, Brazil, Caixa Postal 10.034; S.J.G. de Lima - UFPB

Nanocomposites obtained by melt intercalation is an attractive method where the polymer is mixed with organoclay to permit an intercalation of the polymer molecules among the clay lamellas. The melt intercalation method is favorable of the environmental point of view due to absence of organic solvents and moreover it is compatible with the mixture industrial technical and processing. In this work Brasgel bentonite and four different quaternary salt of ammonium such as alkyl dimethylbenzylammonium chloride, cetyltrimethylammonium chloride, estearildimethylammonium chloride and cetyltrimethylammonium bromide were used to prepare organoclay. Samples were characterized by X-ray Diffraction (XRD) and Infrared Spectroscopy. High density polyethylene (HDPE) was used as matrix. The mixture was processed in a Haake Blucher Torque Rheometer with roller rotors and the mechanical properties were analysed. The samples morphology was visualized by Scanning Electronic Microscopy (SEM). The results showed that the presence of salt has a considerable effect in all the properties of the materials studied.

A-P 032 SYNTHESIS AND CHARACTERIZATION OF KAOLINITE/ POLY(VINYLPYRROLIDONE) NANOCOMPOSITE

J. L. Capitaneo, F. T. da Silva - PEMM-COPPE, Department of Metallurgical and Materials Engineering, COPPE/UFRJ, PO Box 68505, ZIP CODE 21945-970, Rio de Janeiro, Brazil; M. S. Pinho – IpqM; V. R. Caffarena - CBPF

Manufactures fill polymers with particles in order to improve the stiffness and toughness of the materials, to enhance their barrier properties, their resistance to fire and ignition. Nanocomposites are new class of composites, that are particle filled polymers for which at least one dimension of the dispersed particles is in the nanometer range. In this work, kaolinite/ poly(vinylpyrrolidone) nanocomposite was obtained by direct intercalation of PVP into kaolinite by a displacement method (using DMSO as intermediate). Kaolinite was submitted to SEM, XRD, XRF, BET, Malvern, TGA/DSC and FTIR. The kaolinite-dimethylsulfoxide (K-DMSO) intermediate compound and kaolinite- poly(vinylpyrrolidone) nanocomposite (K-PVP) were characterized by SEM, XRD and FTIR. SEM analysis showed varying degrees of imperfection, rounded edges and corners of the kaolinite crystallite.

A-P 033 INFLUENCE OF ORGANOCLAY AND PP-g-AA ON THE PHYSICAL PROPERTIES OF NYLON6

E.M. Araújo, T.J.A. Melo, H.L.D. Araújo, W.D. Araújo, K.D. Araújo, H.S. Ferreira - UFCG, Av: Aprígio Veloso, 882, Bodocongó, Campina Grande, Caixa Postal 10.034; S.J.G. Lima - UFPB

Melt intercalation method was used to prepare mixtures of nylon6 with organoclay and acrylic acid grafted polypropylene (PP-g-AA). The organoclay was obtained by ion exchange of sodium montmorillonite clay with cetyltrimethylammonium bromide. (Nano)composites were prepared using twin screw extruder with 1,0 wt.% of clay. Clays and the salt were characterized by DSC and XRD. The XRD patterns showed the effective intercalation of the salt to expand the layer of clay. The mechanical properties of the mixtures were investigated and showed greater values than neat nylon6. The morphology of these materials were determined and compared to similar materials and the matrix.

A-P 034 MORPHOLOGIC ANALYSIS OF NANOFIBERS OBTAINED FROM ELECTROSTATIC DEPOSITION OF PAN SOLUTIONS

D. S. Gomes, A. N. R. da Silva, N. I. Morimoto - LSI-PSI-EPUSP, Laboratory of Integrated System, Polytechnic School, University of Sao Paulo, Fone: 55 11 30919731 FAX: 55 11 3091 5665 Sao Paulo, Brazil; L. T. F. Mendes - FATEC-SP

Nanofibers from solution of polyacrylonitrile and dimethylformamide (PAN/DMF) can be produced through the electrostatic deposition or electrospinning. In this study it was observed that the precursor solution viscosity has a strong influence on the fiber morphology. It was observed that the increasing the PAN concentration in the precursor solution diminishes the formation of beads and the morphology of obtained fibers are more uniform. Controlling the solution viscosity and the process parameters is possible to obtain fibers with 14-20 nm in diameter. Otherwise for the solution with less than 2% of PAN were obtained mainly beads and it was no possible to perform the measurement of the fibers diameters. So, to obtain nanofibers smooth and with uniform diameters is important to work with solutions were PAN concentration is 4 to 6 %. For all solution used in these work the minimum value of applied voltage necessary to electrospun fibers were 5 kV, for lower values no fibers are obtained at al. The nanofibers were analysed by SEM in order to obtain the diameter and observe the beads concentration.

A-P 035 DEVELOPMENT OF CuCr_2O_4 CERAMIC PIGMENTS BY PECHINI METHOD

E. B. S. Pereira, P. R. G. Gonçalves Júnior, J. H. G. Rangel, M. M. Oliveira, E. Azevedo - CEFET/MA, Avenida Getúlio Vargas n° 4, Monte Castelo; L. P. S. dos Santos, E. Longo - UFSCAR

The ceramic pigments are inorganic substances constituted by a ceramic matrix of crystalline nature and an coloration responsible element that is thermally stable, insoluble in the glazings, resistant to chemical and physical attack and that doesn't produce emission of gases. Most of the ceramic pigments consists of substances that possess a certain crystalline structure, as it is the case of the spinel structure, tends as example the chromite, base of our experiments. With the objective of obtaining nanometric ceramic pigments of black color, the Pechini method was used in the preparation of CuCr_2O_4 , being made the thermal treatment in appropriate temperatures. The powders pigments were characterized in the aspects thermal, structural and morphologic. In TG/DTA the thermal evolution of the powders was observed. XRD allowed the observation of the crystalline evolution and the morphologic characterization for Adsorption of Nitrogen by BET method, used for determination the specific superficial area of the powders.

A-P 036 STRUCTURAL AND OPTICAL CHARACTERIZATION OF $Y_{0,1}Zr_{0,9}O_{1,95}$ (ZY) AND $(Y_{0,05}Nd_{0,05})Zr_{0,9}O_{1,95}$ (ZYN) SYNTHESIZED BY A CHEMICAL ROUTE
D.M.A. Melo, M.A.F. Melo, R.S. Nasar, M. Cerqueira - UFRN, Laboratório de Análise Térmica e Materiais, Departamento de Química, Campus Universitário, S/N, CP:1662, CEP:59072-970, Natal/RN-BRASIL; W.S.C.Sousa - FACEX/Centro de Ciências; M.Sasaki - UFC/Departamento de Física

The $Y_{0,1}Zr_{0,9}O_{1,95}$ (ZY) and $(Y_{0,05}Nd_{0,05})Zr_{0,9}O_{1,95}$ (ZYN) systems were prepared by the polymeric precursors. Neodymium and yttrium nitrates and zirconium propoxide were used as font of cations, using a 1:3 molar ratio of metal and citric acid (Me:Ac). The prepared resins were calcinated at 250°C for 2 h and then at 350°C for different times, at 400°C for 7 h and at 700 e 900°C for 6 h at ambient atmosphere. The resulting powders were characterized by TG/DTG, DTA, FTIR spectroscopy and X-ray diffractometry (XRD). BET surface area and scanning electron microscopy (MEV). The X-ray diffractograms obtained at 250°C are very similar to all systems and indicate the amorphous phase presence. The powders calcinated at 350°C at different calcination time show that cristallinity depends on the calcination time. The ZY and ZYN systems present at 700 and at 900°C phase change from cubic to tetragonal/cubic. The BET results show that the materials calcinated for 7 and 12 h show an increase of specific superficial area with the increasing calcination time while the powders treated for 6 h present a decrease of specific superficial area with the temperature increasing. The nitrogen adsorption/desorption isotherms for the powders calcinated at 900°C for 6 h to the systems present behavior similar showing the type one hysteresis indicating that mesopore structures occur. The amorphous and crystalline powders exhibit luminescence at room temperature in the 624, 543 e 631 nm respectively.

A-P 037 Al_2O_3 NANOPOWDERS OBTAINED BY POLYMERIC PRECURSOR METHOD
S. Cava, S. M. Tebcherani, S. A. Pianaro - UEPG, LIMAC-CIPP, Av. Gal. Carlos Cavalcanti, 4748, CEP 84032-900, Campus Uvaranas, Ponta Grossa-PR, Brasil; C. A. Paskocimas – UFRN; J. A. Varela – UNESP; E. Longo - UFSCar

Nanocrystalline Al_2O_3 powders have been synthesized by the polymeric precursor method. A study of the evolution of crystalline phases of obtained powders was accomplished through X-Ray Diffraction, micro-Raman spectroscopy and refinement of the structures through the Rietveld method. The results obtained allow the identification of three steps on the gamma- Al_2O_3 to alpha- Al_2O_3 phase transition. The single-phase alpha- Al_2O_3 powder was obtained after heat treatment at 1050°C for 2 h. A study of the morphology of the particles was accomplished through measures of crystallite size, specific surface area and Transmission Electronic Microscopy. The particle size growth is closely related to gamma- Al_2O_3 to alpha- Al_2O_3 phase transition.

A-P 038 EFFECTS OF ALKALINE IONS (Sr^{+2} AND K^+) ON THE PORE SIZE DISTRIBUTION OF THE Ni/SiO_2 NANOCOMPOSITES OBTAINED BY THE POLYMERIC PRECURSOR METHOD
R. Tararam, A. A. Cavalheiro, J. A. Varela - IQ/UNESP – Araraquara, R. Prof. Francisco Degni s/n, Araraquara, SP, Brazil - C.P. 355 - CEP. 14801-970

Mesoporous materials have been explored under potential interest in wide range of technological needs. Many aspects, such as control and reproducibility of the dispersed metal nanoparticles on silica were investigated by using of the polymeric precursor method. The goal of this work is to knowledge the effects of alkaline ions (Sr^{+2} and K^+) on the pore size distribution of the Ni/SiO_2 nanocomposites. The evolution of micropore and mesopore volumes and nanoparticle dispersion was also investigated under pirolisis environment. Ni nanoparticles rise under initial polymeric cracking and acts in porosity evolution in a mechanism involving interfacial phenomena. The preferential formation of micropores is enhanced by use of alkaline ions due thermostability effects of the mixed carbonates containing strontium and potassium ions. Morphological characteristics of these composites were investigated by using transmission electronic microscopy showing no substantial changes in constituents phase relation. All of the samples showed high dispersion Ni particles and short range of size distribution (10-30nm).

A-P 039 SOLID SOLUTION OF THE $\text{Li}_2\text{CoTi}_3\text{O}_8$ NANOMETRIC OBTAINED TO THE LOW TEMPERATURE CRYSTALLIZATION AS POSSIBLE PIGMENTS USING MICROWAVE OVEN
M. S. C. Câmara, D. M. A. Melo - UFRN, Laboratório de Análise Térmica e Materiais, CEP 59078-970, Natal-RN, Universidade Federal do Rio Grande do Norte, Brazil, C.P 1662; K. P. Lopes, E. Longo - UFSCar

Ceramic pigments are widely used materials in floors and tiles. For this purpose, they should be easily reproducible and present low particle size allowing drawings with enhanced aesthetic definitions. Nowadays, materials that crystallize in the AB_2O_4 spinel structure are have been the object of great scientific and technological interest, due to their capacity of accommodating different cations in their structure. Therefore, the objective of this work was to synthesize bulk powder of $\text{Li}_2\text{CoTi}_3\text{O}_8$ spinel with nanometric particle size by the polymeric precursor (Pechini) method using conventional oven and microwave. Synthesis of thermal Analysis (TG/DTA), X ray diffraction (XRD), BET, MEV, TEM, Raman, UV-Vis-Nir spectroscopy and CIE-L* a* b* color-measurements were used to characterize the pigments. The powders were initially heat-treated at 300°C for 1h for the elimination of organics. The puff thus obtained was submitted to a second heat-treatment at a temperature ranging 300°C for 30min to 700°C. The spinel was obtained at 300°C/30min, in the microwave oven. Nanometric particles stable up to approximately 1300°C were obtained. The pigments were green for upon calcination at 300°C and 400°C and green-blue from 500°C to 700°C. The results demonstrate the viability of the use of the $\text{Li}_2\text{CoTi}_3\text{O}_8$ spinel as ceramic pigment.

A-P 040 FORMATION OF γ -Sn ISLANDS AT THE INTERFACE OF SiO_2/Si FILMS IMPLANTED WITH Sn
J. M. J. Lopes, F. C. Zawislak, P. F. P. Fichtner - IF-UFRGS, Av. Bento Gonçalves 9500, Instituto de Física – UFRGS, Cx. Postal 15051, 91501-970 Porto Alegre, Brazil; T. Marcondes - PG-Micro; R. M. Papaléo - Faculdade de Física, PUC-RS; F. Lovey, A. Condó - Centro Atomico Bariloche, Bariloche, Argentina

Thin films of SiO_2 on Si (100) were implanted with 120 keV Sn ions at a fluence of $1.5 \times 10^{16} \text{ cm}^{-2}$. After high temperature (900-1100°C) thermal annealings, an array of Sn-Si islands were observed at the $\text{SiO}_2/\text{Si}(100)$ interfaces due to migration of the implanted Sn ions (initially located at around the middle of the oxide layer). The island system was characterized by transmission electron microscopy (TEM), scanning force microscopy (SFM) and Rutherford Backscattering Spectrometry under channeling conditions (RBS/C). TEM observations on cross-section samples showed either trapezoidal or pyramidal islands (about 1-2 nm high and with a 4-7 nm wide base) epitaxially attached to the Si matrix. SFM images of the Si surface, obtained after oxide removal, revealed also ~ 1-2 nm high protrusions, packed in a relatively ordered arrangement at an area density of roughly $1 \times 10^{11} \text{ cm}^{-2}$. TEM images of the lattice suggest that the islands have a diamond-like structure, with a lattice parameter slightly larger than that for pure Si crystals. This causes additional strain contrast and plane misalignment with respect to the Si matrix. The breakdown of the planar SiO_2/Si interface and the appearance of the island system is discussed in terms of elastic strain energy accumulation due to the lattice misfit. The influence of the damage produced by Si and O recoils on the stability of the SiO_2/Si interface and on the island formation is also discussed.

A-P 041 EFFECT OF ANNEALING ATMOSPHERE ON THE STRUCTURE AND LUMINESCENCE OF SN NANOCRYSTALS IN SiO₂ THIN FILMS
J. M. J. Lopes, P. F. P. Fichtner, F. C. Zawislak - IF-UFRGS, Av. Bento Gonçalves 9500, Instituto de Física - UFRGS, Cx. Postal 15051, 91501-970 Porto Alegre, Brazil

Sn nanoclusters are synthesized in 180 nm SiO₂ layers after ion implantation and heat treatment. Annealings in N₂ ambient at high temperatures (higher than 700 °C) lead to the formation of Sn nanoclusters of different sizes in metallic and in oxidized phases. High-resolution transmission electron microscopy (TEM) analyses revealed that the formed larger nanoparticles are composed by a Sn metallic core and a SnO_x shell. The corresponding blue-violet photoluminescence (PL) presents low intensity. However, for heat treatments in vacuum, the PL intensity is increased by a factor of 5 and the TEM data show a homogeneous size distribution of Sn nanoclusters. The low intensity of PL for the N₂ annealed samples is associated with Sn oxidation.

A-P 042 ECAP IN 3104 ALUMINUM ALLOY
F. P. S. Melo, A. Caporalli Filho - Unesp, Av. Ariberto Pereira da Cunha, 333, Guaratinguetá, SP, Brazil, CEP 12500-000

Equal Channel angular pressing (ECAP) is one of the methods of severe plastic deformation for producing ultra fine-grained material. Studies of ECAP process become important because of the fact that during the multi-passes the accumulated plastic deformation creates and promotes a microstructure refinement obtaining nanometric grains resulting in better mechanical material properties. Metallic aluminum alloys show lots of applications so the development of new alloys as recycled and mechanisms that can improve their properties have a great technological value. This paper has the purpose to study the material's flow mode applying ECAP process and analyze the variables of this process applying it in plasticine and in 3104 aluminum alloy. The choice of 3104 Aluminum alloy is justified by the fact that this alloy can be deformed only by plastic deformation.

A-P 043 CHARACTERIZATION OF COMMERCIAL TiO₂, Al₂O₃ AND SiO₂ NANOPARTICLES PROCESSED BY VAPOR PHASE PROCESS
T. G. Conti, T. R. Giraldo, J. A. Varela, E. Longo, E. R. Leite - UFSCar, Rod. Washington Luiz km 235 - Sao Carlos, SP, Brazil

The study of nanostructured materials has been receiving increased attention because of their unique electronic, optical and photoelectronic properties. In this sense, the preparation of ultrathin films for such applications has been broadly studied. The literature report several methods to process ultrathin films. One of the most promising techniques is the spin-coating deposition of colloidal nanocrystal suspensions, due to its simplicity and low cost. The main target of this work is to characterize TiO₂, Al₂O₃ and SiO₂ commercial nanoparticles synthesized by a vapor phase process. From this, subsequent studies will be accomplished to obtain ultrathin films from colloidal nanocrystal suspensions. The nanoparticles were characterized by BET, XRD and Zeta Potential. The BET technique was used to verify the superficial area, and to observe that the particles have nanometric dimensions. The crystalline phases of the materials were investigated by X-ray diffraction (XRD). Zeta Potential measurements were done to verify the stability of the suspensions. The results are essential to enable the preparation of stable colloidal suspensions. Moreover, it can be concluded that it is indispensable to characterize the nanoparticles to develop a methodology to control thin film deposition.

A-P 044

DISPERSION OF LATEX NANOPARTICLES IN ANISOTROPIC FLUIDS

E. A. de Oliveira, V. M. Alves, S. Nakamatsu - IFUSP, R. do Matão, trav. R, 187, CEP 05315-970, Caixa Postal 66 318- São Paulo-SP

Suspensions of particles in nematic liquid crystals leads to new composite materials with physical properties that reflect the orientational order of the medium, allowing one to get ordering colloids. In particular, in lyotropic nematics one can handle with situations where the dimension of dispersed particles is smaller or comparable to the anisotropic units that forms the liquid crystalline structure. We investigated the dispersion of latex nanoparticles, 100nm in diameter, dispersed in two different lyotropic systems, where the dimension of the micelles is typically 7nm. It is observed the formation of three dimensional aggregates, rich in latex particles. The aggregates are elongated, with typical dimension between 30 and about 50 nm and tilted with respect to the orientation of the micelles in the nematic phases. The latex nanoparticles can be completely dispersed, depending on the composition and the temperature of the lyotropic system. The phase diagrams for two different lyotropic system are presented, as a function of the latex concentration and temperature, and for different composition of the lyotropic system and a fixed amount of latex nanoparticles. The mesophases are identified by optical observations in a polarizing microscope.

A-P 045

MAGNETIC NANOPARTICLES WITH BIOMEDICAL APPLICATIONS

A. D. Arelaro, A. L. Brandl, G. F. Goya - IF-USP, Laboratório de Materiais Magnéticos, Instituto de Física, Universidade de São Paulo, CEP 05508-900 São Paulo, Brasil

Magnetic Iron-Oxide Nanoparticles (MION) offer several attractive possibilities in biomedicine, such as magnetic separation and magnetic resonance imaging (MRI) contrast enhancement. The contrast agent media used in MRI are subdomain iron oxide particles, mainly magnetite (Fe_3O_4), coated with a polysaccharide and suspended in water-based solvents for biocompatibility reasons. We present a study on the magnetic properties of a commercial magnetic fluid of current clinical applications (ENDOREM®) through Mössbauer spectroscopy (MS), dc magnetization, and ac susceptibility measurements. Magnetization $M(T)$ curves in zero-field-cooling mode showed blocking temperatures $T_B = 42\text{-}52$ K, depending on particle concentration and applied field. Accordingly, MS data taken at room temperature showed that the particles were superparamagnetic. From magnetic measurements we estimated a mean particle size $\langle d \rangle = 14(1)$ nm in good agreement with the mean particle diameter $\langle d \rangle = 10.3$ nm seen from Transmission Electron Microscopy. The anisotropy energy constant was determined. from the thermal dependence of the magnetic hyperfine field $B_{\text{eff}}(T)$, using the expression for collective excitations, where $B_0 = B(T=0)$ and, $E_a = K_{\text{eff}}V$ is the anisotropy energy barrier. The ac susceptibility data showed a thermally activated blocking process that also reflects the increase of energy barrier with increasing interparticle interactions.

A-P 046 METAL NANOPARTICLES INCORPORATION DURING THE PHOTOPOLYMERIZATION OF POLYPYRROLE

C. R. Martins, Y. M. B. Almeida, W. M. Azevedo - DQF-CCEN- UFPE, Departamento de Engenharia Química, CTG-UFPE, Av. Prof. Artur de Sá s/n, Cidade Universitária, 50740-521, Recife, PE, Brazil; G. C. Nascimento - ITEPE

The incorporation of metal nanoparticles in intrinsically conducting polymers (PICs) have attracted much attention due to the possibilities of producing suitable materials for electrocatalysis, chemical sensors and microeletronic sensors. In this work we prepared these PICs through the photopolymerization of pyrrole assisted by metals ions, where in the process the pyrrole monomer is polymerized and consequently the silver metals particles are produced. The resulting composite films were characterized by conductivity measurements, UV/vis and FTIR spectroscopy. The morphological properties of incorporated silver nanoparticles were examined with respect to the nature of substrates, exposure time and monomer ratios. Soon after the nitrate silver solution containing pyrrole is excited by UV light, a black polymer deposition on glass wall or other substrates, such PET (poly (ethylene terephthalate)) occur, however if the solution is set aside protected from light the films takes more than 48 h to form. The conductivity determined for the silver/polypyrrole composite was found to be 10^{-3} S cm⁻¹. The UV-visible absorption and infrared analysis confirm both, the formation of silver particles and pyrrole polymerization. The mechanism for the formation of silver nanostructure during the photopolymerization has been investigated.

A-P 047 MAGNETIC AND STRUCTURAL PROPERTIES OF ELECTRODEPOSITED Fe_{1-x}Co_x NANOWIRES

E. P. Hernandez, A. G., S. M. Rezende - DF-UFPE, Laboratório de Magnetismo e Materiais Magnéticos, Departamento de Física, UFPE, 50670-901, Recife, PE, Brasil; Daniel R. Cornejo IF-USP

We present an anodic aluminum oxide (AAO) template preparation and the posterior electro deposition of Fe_{1-x}Co_x (x = 0.2, 0.4, 0.5) magnetic nanowires. Pure Al (99.999%) foils were anodized in oxalic acid to the template fabrication using the Two-Step Method. Anodization at 40 V and 5 - 18 hours in oxalic acid solution electrolyte reveled nanopores of 30-100 nm diameter. (FeSO₄)_{1-x}(CoSO₄)_x based solution was the electrolyte to the Fe_{1-x}Co_x nanowires fabrication and XRD, SEM and TEM reveled the structural and morphological properties of the Fe_{1-x}Co_x final nanowires. Magnetic properties of Fe_{1-x}Co_x electrodeposited nanowires were carried out using an AGM prototype and ferromagnetic resonance (FMR). H_c and squareness (Mr/Ms) showed a hard geometric and composition dependence. Short annealing at 200, 250, 300, 350 and 400 oC showed a hard effect in magnetic properties of Fe₆₀Co₄₀ nanowires.

A-P 048

ENCAPSULATION OF A DIGESTIVE ENZYME IN SOL-GEL MATRICES

C. D. Moreira, G. A. M. Safar, P. A. Robles-Dutenhefner, F. S. Lameiras, E. M. B. de Sousa - CDTN/CNEN, Centro de Desenvolvimento da Tecnologia Nuclear. Rua Professor Mário Werneck, s/n. Campus Universitário, Belo Horizonte, MG, Brazil. CEP- 30.123-970; A. M. C. Santos, M. A. R. Paiva, M. P. Bemquerer, M. M. Santoro - UFMG

The synthesis of inorganic oxide material by a sol-gel technique through the formation of colloidal suspension (sol) and gelation of the sol into the gel enables incorporation of heat-sensitive active substances into the material during processing. In this work, sol-gel matrices with and without the presence of enzyme were obtained from tetraethylorthosilicate (TEOS) in the presence of small amount of HCl, used as a catalyst. Samples in the absence of enzyme were structurally characterized by both scanning electron microscopy and nitrogen adsorption-desorption techniques. Beta-Trypsin purified by ion exchange chromatography was successfully immobilised in a silica matrix via direct mixture in a sol-gel process. The enzyme immobilisation was nearly 100 % efficient. The enzyme remained active after several weeks post-synthesis as confirmed through hydrolysis of the chromogenic substrate N- α -benzoyl-DL-arginine-4-nitroanilide (BAPNA). The nanostructure of the pores in the silica matrix allowed the BAPNA to enter and react with the enzyme. BAPNA was also used to detect any possible leaching from the matrix after successive washing cycles. This one-step immobilisation is interesting for technological applications. Beta-Trypsin was also investigated concerning its role in the hydrolysis of silicon alkoxyde and polymerisation of monomeric silica through a colorimetric method.

A-P 049

NANOCARBONS OBTAINED BY ARC-WATER METHOD USING H₃VO₄ SOLUTION

J. M. Rosolen, R. A. S. Nascimento, J. C. O. Garcia, L. A. Montoro - FFCLRP-USP, AV. Bandeirantes, 3900; P. Corio - IQ-USP

In the area of synthesis of the carbon nanotubes, the arc-discharge method is particularly interesting because it allows investigations about the role of catalyst in the preparation of single-walled carbon nanotubes (SWNTs). More recently, the arc-discharge method has been adapted for operation in liquid environment, a variation that allows the preparation of several kinds of nanocarbons, e.g. onions, nanohorns superbundles and multi-walled carbon nanotubes (MWNT). In this work we report the synthesis of nanocarbons through arc discharge method in H₃VO₄ aqueous solutions using pure graphite electrodes. This solution was found to be very interesting in the preparation of SWNT in liquid environment using carbon bars free of metallic catalyst. The raw material found mostly at the bottom of the reactor was collected by filtration and characterized by Raman spectroscopy and by scanning electron microscopy and high-resolution transmission electron microscopy. Our results demonstrate that the arc-water process can be also an alternative method for the synthesis of single-walled carbon nanotubes with the correct choice of liquid environment.

A-P 050 MONTE CARLO SIMULATIONS OF CdTe QUANTUM DOTS GROWN ON Si(111)
S. C. Ferreira Jr., S. O. Ferreira - UFV, Departamento de Física, CEP 36571-000, Viçosa, MG, Brazil

Semiconductor quantum dots have attracted a lot of attention in recent years. Almost the totality of the structures studied have been grown using the Stranski-Krastanow growth mode, but it has been shown recently that the growth of CdTe quantum dots on Si(111) substrates using hot wall epitaxy obeys the Volmer-Weber growth mode (Ferreira et. al., J. Appl. Phys. 93, 1195 (2003)). However, some features concerning the dynamics of this system are not completely understood. Thus, in this work we propose a 1+1 deposition model in which diffusion and adsorption are considered. In the diffusion process, CdTe adatoms migrate to the highest position of their next-neighbor sites with probabilities that depend of the local configuration. In the adsorption processes, the particles simply are excluded representing the revaporization phenomena. Even in this over-simplified one-dimension model, several fundamental features present in the experiments were revealed. In a range of temperature consistent with the experiments, the patterns exhibit island nucleation with size and height distributions in qualitative agreement with those experimentally observed. We also studied the substrate coverage and roughness. In all simulations the non covered substrate fraction decays exponentially whereas the roughness w grows as a power law $w \propto t^\alpha$, where $\alpha \approx 0.45$. Finally, it is important to mention that more realistic simulations in 2+1 dimensions are been currently developed.

A-P 051 NiTiO₃ NANOPARTICLES ENCAPSULATED IN SiO₂ MATRIX
K. P. Lopes, R. F. Gonçalves, A. Spinelli, E. Longo, E. R. Leite - UFSCar, CMDMC-LIEC-DQ-UFSCar, Rodovia Washington Luiz km 235, São Carlos-SP, Brazil, CP 676

Encapsulation of materials has been very employed in industries: pharmaceutical products, agricultural, cosmetics and ceramics. The coatings improve the chemical, thermal and mechanic stability of the product and change physical, chemical and biological properties of the material. Oxide surface can be modified by sol-gel process mostly when the particles are in nanometric scale. Therefore, this work show a way to coat nanometric particles of nickel titanate with an amorphous layer of silica, by sol-gel method. The efficiency of the encapsulation was confirmed by transmission electronic microscopy (TEM), isoelectric point variation of the dispersed particles in ethanol and also by the energy dispersive X ray analysis (EDX).

A-P 052 SPECTROSCOPIC PROPERTIES OF TiO₂ SOL-GEL FILMS DOPED WITH RHODAMINE 6G DYE

W. M. de Azevedo, E. F. da Silva Jr - UFPE, Departamento de Química Fundamental, Universidade Federal de Pernambuco, Cidade Universitária, 50670-901, Recife-PE, Brazil; I. Pepe, A. Ferreira da Silva - UFBA; S. A. Tomas - Centro de Investigacion y de Estudios Avanzados IPN; R. Palomino, R. Rozada - Facultad de Ciencias Fisicas y Matematicas, BUAP; C. Persson, and R. Ahuja - Department of Materials Science and Engineering, Uppsala University

The spectroscopic properties of titânia (TiO₂) thin films prepared by the sol-gel process and doped with rhodamine 6G were studied by photoacoustic absorption, excitation and emission spectroscopy. The doped thin films were prepared by a dip coating process, where Corning glass substrates were dipped in a solution containing rhodamine 6G (with concentrations in the range from 0,01 to 0,1 % mol.), titanium isopropoxide, isopropanol and acetic acid. The absorption spectroscopic analysis of the films at very low concentration shows that only two absorption bands appear, one at 2.2 eV attributed to rhodamine 6G and the second above 3 eV attributed to TiO₂ absorption; As the rhodamine concentration increases, two additional absorption bands appear one at 2.4 eV attributed to rhodamine molecular dimer formation (which is responsible for the fluorescence quenching of the sample), and the second absorption band at 2.8 eV probably due to defect states induced by the interaction of rhodamine 6G with the TiO₂ surface. This absorption band seems to saturate at the rhodamine concentration of 0.02 %. The excitation analysis shows an efficient energy transfer between the TiO₂ conduction band and the molecular rhodamine 6G excited states, yielding a strong emission band at 600 nm. In addition, the experimental data of the optical absorption and band gap energy as well of the TiO₂ films done at room temperature are compared with zero-temperature theoretical results.

A-P 053 PbTe QUANTUM DOT TELLURITE GLASS OPTICAL FIBERS

L. C. Barbosa, G. Jacob, E. Rodriguez, A. R. Neves, W. M. Moreira, C. L. César - UNICAMP/IFGW/DEQ/CEPOF, Cidade Universitaria Zeferino Vaz s/n - Campus Barão Geraldo-Campinas - SP- Brazil-CEP 13083-970

We show the successful fabrication of PbTe quantum dot doped tellurite glass optical fibers. The quantum dot doped optical fiber fabrication has been very difficult because many factors. First the nucleation and growth temperature are usually below the optical fiber drawing temperature. Second, it has been difficult to avoid glass crystallization. Third, the core/clad refractive index control is not easy and finally the core/clad expansion coefficient mismatch is usually high. We solved each one of these problems using tellurite glasses as the PbTe quantum dots host. We first studied the tellurite glasses thermo physical properties for several compositions and the crystallization process for each composition. Then we studied the PbTe solubility for each composition. The preform was made by the rod-in-tube technique and the fiber drawing in a Heathway Drawing Tower. The quantum dots inside the fiber morphology were studied by High Resolution Transmission Electron Microscopy and the fiber guiding properties were observed by laser spectroscopy.

A-P 054 LUMINESCENCE EUROPIUM COMPLEX INCORPORATED IN CUBIC MESOPOROUS SILICA

L. C. Cides da Silva, T. S. Martins, P. C. Isolani, H. F. Brito, E. E. S. Teotônio, J. R. Matos - IQ-USP, Rua Prf Luciano Gualberto, 748, S. Paulo, Brazil, CP 26077 - 05513-970; M. Santos Filho - EAM_M-ITA; M. C. A. Fantini - IF-USP

FDU-1 is a highly ordered, large-pore silica with cage-like mesoporous cubic structure. The material is from TEOS in the presence of PEO-PBO-PEO template in strongly acid media, using microwave over as heating source¹. These structures are suitable as host or encapsulation media. Rare earths are used in different applications that require their specific spectroscopic and magnetic properties, among others. Sometimes these properties applications are limited by the poor thermal stability of rare earth compounds. However, this property can be improved by the incorporation of rare earth complexes in ordered mesoporous silica. In this context rare earth complex, $\text{Eu}(\text{dbm})_3\text{TPPO}$ was incorporated into unmodified and modified FDU-1 silica by APTES (3-aminopropyltriethoxysilane). The samples were characterized by infrared absorption, thermal analysis, small angle scattering X-ray diffraction and luminescence. The decomposition temperature increase after incorporation of the complex inside the mesoporous silica. The ordered mesoporous silica structure remains the same after the complex incorporation. The Eu^{3+} present luminescence inside the mesoporous medium. The results with $\text{Eu}(\text{pic})_3 \cdot 2\text{Leu} \cdot 5\text{H}_2\text{O}$ will be compared.

A-P 055 INTERFACIAL MAGNETISM OF NiFe/FeMn/NiFe EXCHANGE-BIASED TRILAYERS

V. P. Nascimento, A. D. Alvarenga, W. Alayo, E. Baggio-Saitovitch - CBPF, Rua Dr. Xavier Sigaud, 150, Urca, Rio de Janeiro, Brazil, 22290-180; E. C. Passamani -UFES

Here we report on the influence of the roughness on the exchange bias effect in trilayers of Py/FeMn/Py (Py=Ni₈₁Fe₁₉), deposited under an applied magnetic field of 460 Oe on Si<110> substrate by dc magnetron sputtering, at the Thin Films Laboratory of CBPF/MCT-RJ. Trilayers were prepared under different Ar gas pressures (2, 5 and 10 mbar), in order to produce distinct layer roughness. X-ray diffraction has shown that FeMn grows in the g phase, essential for the existence of EB in the Py/FeMn system. Reflectivity experiments suggest that the layer roughness increases with working pressure. XMCD experiments were performed at the D08A-SGM beam line of LNLS, Brazilian synchrotron facility. A dichroism at the Mn -L_{2,3} edges and an out-of-plane component of the Fe magnetic moment were observed at the Py/FeMn interface. For conversion electron Mössbauer spectroscopy (CEMS) at 300 K, the samples were prepared with a ⁵⁷Fe thin layer at the interface to serve as a probe. For samples prepared at 2 mbar it was possible to obtain a good signal to noise ratio, while no spectrum was observed in case of samples prepared at higher working pressure. The Mössbauer spectra of the 2 mbar samples are basically composed by two components: a slightly broadened sextet, with the Ni₈₁Fe₁₉ hyperfine parameters and a broad paramagnetic subspectrum resulting from the g-FeMn phase from the spacer layer and from an alloy that is formed due to the NiFe and FeMn interdiffusion process.

- A-P 056 LAYER-BY-LAYER FILMS OF POLY(O-ETHOXYANILINE) DOPED WITH DODECYLBENZENESULFONIC ACID
H. H. Takeda, L. G. Paterno, A. Firmino - USP, AV. Trabalhador São Carlense, 400, São Carlos, Brazil, Caixa Postal 369; L. H. C. Mattoso - Embrapa-CNPDA

Doping of PANi and its derivatives through acid-base reaction has been widely used in order to obtain polymers with tailored morphology and properties. This approach has been used in our laboratory for preparation of thin films of poly(o-ethoxyaniline)-POEA with different electrical responses to be used in a taste sensor system. In a particular experiment, dodecylbenzenesulfonic acid-DBSA was added to a POEA non-doped solution and different parameters, such as pH and acid concentration, were evaluated. After a careful investigation POEA-DBSA doped solutions were obtained and thin films were fabricated by the layer-by-layer method. According to UV-Vis and FT-IR data, POEA films were found to be doped, with DBSA being incorporated into the film structure. Moreover, alternating dipping of glass slides into POEA and DBSA solutions has promoted a greater adsorption of POEA onto the films which is mainly due to the screening effect of DBSA over the POEA positive charges diminishing local electrostatic repulsion. AFM images have showed a different morphology for POEA-DBSA films compared to POEA-HCl films.

- A-P 057 THERMAL STABILITY OF $(\text{HfO}_2)_x(\text{Al}_2\text{O}_3)_{1-x}$ ULTRA-THIN FILMS ON SILICON
C. Driemeier, L. Miotti, K. P. Bastos - IF/UFRGS, Instituto de Física, UFRGS, Av. Bento Gonçalves, 9500, Porto Alegre, Brazil, Caixa Postal 15051, CEP 91501-970

Hafnium aluminates are among a new class of high permittivity dielectrics (high-k dielectrics), which are being intensively studied aiming at replacing SiO_2 as gate dielectric in metal-oxide-semiconductor field-effect transistors. The thermal stability of $(\text{HfO}_2)_x(\text{Al}_2\text{O}_3)_{1-x}$ ultra-thin films on silicon was accessed by performing rapid thermal annealing at 1000°C for 10 s in atmospheres containing different oxygen pressures, simulating a critical device fabrication step. Oxygen diffusion through the dielectric and compositional degradation of the stacks were investigated making use of nuclear reaction analyses, nuclear reaction profiling, Rutherford backscattering spectrometry and x-ray photoelectron spectroscopy. Metal losses from the film and substrate silicon oxidation were observed. The metallic species lost and oxygen diffusivities are shown to depend on the stoichiometry of the film. Oxygen pressure during annealing is shown to influence substrate oxidation rate but has no effect on metal losses, indicating that the latter process is thermal-activated only. Silicon migration from the substrate into the film was not observed, differently from other high-k materials reported at the literature.

- A-P 058 UNUSUAL PENTAGONAL STRUCTURES IN ATOMIC-SIZE Cu NANOWIRES
J. C. González - UFMG, Departamento de Física, Instituto de Ciências Exatas, Universidade Federal de Minas Gerais, Caixa Postal 702, 30123-970, Belo Horizonte, MG, Brazil; V. Rodrigues, J. Bettini, D. Ugarte - LNLS; L. G. C. Rego - UFSC; A. R. Rocha - TCD; P. Z. Coura, S. O. Dantas - UFJF; F. Sato, D. S. Galvão - UNICAMP

We present a study of the structural and quantum conductance properties of atomic-size copper nanowires generated by mechanical stretching. The atomistic evolution was derived from time resolved electron microscopy observations and molecular dynamics simulations. We have analyzed the quantum transport behavior by means of conductance measurements and theoretical calculations. The results reveal the formation of an unusual and highly stable pentagonal Cu nanowire with a diameter of ~ 0.45 nm whose conductance is ~ 4.5 conductance quanta.

A-P 059 FABRICATION OF GRATINGS BY DIRECT WRITING UV IRRADIATION BASED ON ORGANIC-INORGANIC HYBRID MATERIAL BY SOL-GEL METHOD

S. J. L. Ribeiro, D. C. Oliveira, C. Molina, K. Dahmouche, Y. Messaddeq - UNESP-IQAr, Rua Professor Francisco Degni, s/n; A. Vesperini - Université d'Angers - POMA; M. Siu Li - USP-IFSC; R. R. Gonçalves - USP-FFCLRP; L. D. Carlos - Univ. de Aveiro-Dpto Física-CICECO

Sol - gel processing offers a low temperature route for the development of functional optical materials for integrated optic (IO) devices at low cost. Our work are based on organic-inorganic hybrid termed diureasil represented by U(600) where 600 represents the average molecular weights of the organic polyether chains bonded at both ends of the siliceous nanodomains. Zirconium nanoparticles were loaded to this host and films were obtained, varying the molar ratio Zr:Si, by spin coating technique. Gratings were successfully fabricated by conventional optical interference method using a Lloyd interferometer and a Krypton UV laser operating at 337.5 nm. An He-Ne laser were employed to probe the recording gratings on real time. The diffraction efficiency was obtained as a function of time exposure and nominal composition of the film. Scanning Electronic Microscopy (SEM) has been used to investigate the gratings surface. U(600) containing zirconium are promising material for the production of gratings by direct writing using UV laser irradiation and show an interesting potential for the development of integrated optical devices.

A-P 060 TERNARY TiO₂-SiO₂-ZrO₂ MESOPOROUS OXIDES OBTAINED BY SOL-GEL METHOD COMBINED WITH SURFACTANTS

J. Retuert, E. Pabon, K. Gutierrez, F. Casas, R. Quijada - Centro para la Investigación Avanzada en Ciencia de Materiales(CIMAT) and Facultad de Ciencias Fisicas y Matematicas, Universidad de Chile.

Many systems, such as pure titania, silica and zirconia, have been extensively studied as catalyst or catalyst support for heterogeneous catalytic reactions. Recently TiO₂/ZrO₂ mixed oxides have received much attention as catalysts due to its acid-base properties. The preparation of binary or multicomponent solid oxides can be carried out at low temperature by the sol-gel method, being the control of the hydrolysis and condensation rates of the various molecular precursors used of paramount importance. The difference in reactivity can be minimized by controlled prehydrolysis of the less reactive precursor and/or by chemical modification of the precursors. In this work mesoporous titania-silica-zirconia with highly dispersed titania and zirconia have been prepared by an alcoxide sol gel process. Tetraethylortosilicate prehydrolyzed with acid catalysts, tetraisopropoxytitanium and n-propoxide zirconium, modified by adding methoxyethanol and acetylacetonate respectively, where used as precursors. The surfactants Triton X100, Tween 60 and CTAB were used as pore forming agents. The products were dried at 70°/24h and then calcinated at 550°C/2h resulting in the formation of a continuous, purely inorganic, amorphous network. The ternary Si/Ti/Zr oxides were characterized by means of N₂-physisorption, X-ray diffraction, thermal analysis, SEM, and vibrational spectroscopy (FTIR). The mixed Si/Ti/Zr networks have different structures and surface areas ranging from 100-650 m²g⁻¹.

A-P 061 COMPARATIVE THERMOGRAVIMETRIC AND ADSORPTION STUDY OF HIGHLY ORDERED MESOPOROUS MATERIALS

L. M. Mercuri, J. R. Matos - CETEC-UNICSUL and IQ-USP, LATIG-IQ-USP, Av. Prof. Lineu Prestes, 748, São Paulo, Brazil, CEP.05508-900; Z. Li, M. Jaroniec - DC-KSU

A comparative study was carried out for the highly ordered mesoporous materials (HOMMs) using high resolution thermogravimetry (HR-TGA) and adsorption techniques. These materials were synthesized with mixed surfactants of different alkyl chain lengths. For the thermogravimetry measurements, n-butanol was used to probe the surface of the adsorbent and the high-resolution TG/1stDTG/2ndDTG curves were obtained under controlled conditions. The values of the mesopore volume and specific surface area from the TG data are in a good agreement with those evaluated from low-temperature nitrogen adsorption isotherms. The evaluation and comparison between the thermogravimetry and nitrogen adsorption data was performed to confirm the usefulness of the TG/DTG as an alternative method to mesopore volume and specific surface area determination of the HOMMs studied.

A-P 062 GEOMETRIC DESCRIPTION OF NANOPOROUS EARTH BRICKS

J. Calabria A., W. L. Vasconcelos - UFMG, Rua Espírito Santo, 35 - Centro - BH - Brasil

In this work we investigated the pores nanostructural evolution of raw earth bricks (adobes) and fired bricks in leaching environments (deionized H₂O and Na₂S₂O₅). We used computational modeling to help visualize the nanostructures of the systems (adobes and fired bricks). We applied the modeling to the materials before leaching and also to the materials exposed to leaching for different times (1, 10, 30 and 100 days). The true density of the ceramics before and after leaching was measured using helium pycnometry. The specific surface area, pore diameter and pore volume were evaluated using nitrogen sorption (BET method). The initial specific surface area for the adobe was 44 m²/g and for the fired brick the specific surface area was 28 m²/g before leaching. After 100 days of exposure to simulated acid rain media, the adobe specific surface area was 42 m²/g while the fired brick presented 0.3 m²/g of specific surface area. Using mercury pycnometry, we observed that the bulk density of both, the adobe and fired brick, increased for longer leaching times.

A-P 063 CHEMICAL LEACHING IN NANOPOROUS STRUCTURAL CERAMICS

J. Calabria A., R.S.C. Magalhães, W.L. Vasconcelos - UFMG, Rua Espírito Santo, 35 - Centro - BH - Brasil; M.P. Ferreira - CDTN

In this work we studied the effects of leaching in the nanostructure of raw earth bricks (adobes) and fired bricks used as building materials. As leaching media we used deionized water and a solution containing Na₂S₂O₅ in order to simulate acid rain. The composition of the water was evaluated using a neutron activation technique. We carried out the leaching experiments using exposition times varying from one day to 100 days. The chemical composition of the residual liquid, after the leaching experiments, was measured using high performance liquid chromatography (HPLC). We followed the changes in Na⁺ and K⁺ contents with the time of leaching. Chemical groups present on the surfaces of the ceramics were evaluated using Fourier transform infrared spectroscopy (FTIR). We observed the presence of larger amounts of OH groups on the surface of the adobe.

- A-P 064 SPECTROSCOPIC STUDY OF SOL-GEL EUROPIUM GADOLINIUM TANTALATES
R. R. Gonçalves - USP, FFCLRP, Av. Bandeirantes 3900, cep 14040-901, Ribeirão Preto-SP, Brazil; D.C. Oliveira, Y. Messaddeq, S.J.L. Ribeiro - UNESP

Gadolinium tantalates present interesting properties regarding optical applications. First, high active rare earth concentration can be included during the synthesis of these materials. Secondly, these materials present high refractive index and relatively low vibrational energy. Efficient radiative emission and low non-radiative decay are therefore observed for excited states. Usually solid state synthesis are described for tantalates and we describe here the preparation by the so-called sol-gel methodology of europium doped gadolinium tantalates. Starting from amorphous xerogels different crystal phases could be obtained depending on the temperature of heat treatment. These phases were identified by X-ray diffraction and by site selective luminescence spectroscopy (emission and excitation spectra and time of decay of excited state of europium).

- A-P 065 CARRIER MOBILITY FITTING FOR InAs/GaAs SUPERLATTICES SAMPLES WITH QUANTUM DOTS
L. R. de Souza, D. A. W. Soares, R. M. Rubinger - UNIFEI, Departamento de Física e Química, ICE, UNIFEI - Itajubá - MG, Cx. Postal 50; 37500 903; G. M. Ribeiro, A. G. de Oliveira, W. N. Rodrigues, J. C. Gonzalez - UFMG

We have carried out van der Pauw resistivity and Hall effect measurements to obtain the mobility on a series of Molecular Beam Epitaxy InAs/GaAs superlattices samples containing InAs quantum dots. Three growth parameter were varied, the InAs coverage, the number of repetitions of the InAs/GaAs layers and the GaAs spacer thickness. The measurements were done in a 5K to 310K temperature range. The results presenting samples with low resistivity and the mobility dependence on the temperature were adjusted in order to evaluate the applicability of the known models. Due to quantum confinement at the GaAs/InAs interface, all scattering mechanisms were considered for a two-dimensional electron gas. The considered scattering mechanisms were deformation potential scattering, piezoelectric scattering for acoustic phonons, polar optical scattering for optical phonons and ionized impurity scattering. The scattering by ionized impurities revealed dominant at the low temperatures and the polar optical scattering at high temperatures.

- A-P 066 SYNTHESIS OF THE ARRAYS OF MAGNETIC Ni NANOWIRES
V. R. Caffarena, A. P. Guimarães Filho - CBPF, Rua Dr. Xavier Sigaud, 150 - Urca - RJ, Brazil - ZIP CODE: 22290-180, R. A. Simão, J. L. Capitaneo - PEMM-COPPE

One-dimensional (1D) nanostructures have attracted considerable attention owing to their potential applications in a new generation of nanodevices and template synthesis method has been playing an important role in the fabrication of many kinds of nanowires and nanotubes, for its interesting and useful features. Nanowires are expected to play an important role in future electronic and in nanoelectromechanical systems. When the wire diameter is of the same order as the charge carrier wavelength, quantum confinement effects shift energy states and the properties of nanowires strongly depend on size, shape and structure. We studied the Ni nanowire arrays electrodeposited in the nanoporous anodic alumina membrane from a sulfate electrolyte containing 270 g/l NiSO₄.7H₂O, 40 g/l NiCl₂.H₂O and 40 g/l H₃BO₃. The particle size was determined by AFM and SEM and samples were characterized using XRD and FTIR.

A-P 067

IMMOBILIZATION OF LIPID VESICLES IN NANOSTRUCTURED POLYMER FILMS

M.L. Moraes, V. Zucolotto, O.N. Oliveira Jr. - IFSC, Grupo de Polímeros, IFSC, Av. Trabalhador São Carlense, 400, São Carlos, SP, Brazil, CP 369

Artificial vesicles comprising concentric lipid bilayers have been widely exploited as building blocks for artificial membranes, in studies to mimic the drug absorption processes and to investigate membrane interaction with drugs and proteins. Lipid vesicles are also candidate materials for controlled drug delivery, but this requires steric stabilization for the vesicles may be rapidly cleared from the blood by physiological species. In this work we report on the immobilization and stabilization of layers of 1,2-dipalmitoyl-sn-Glycero-3-[Phospho-rac-(1-glycerol)] (Sodium Salt) (DPPG) in layer-by-layer (LbL) films, alternated with poly(amidoamine) G4 (PAMAM) dendrimer. Thin films containing up to 20 PAMAM/DPPG bilayers were assembled onto glass or/and silicon wafers substrates. The growth of the multilayers was obtained by immersing the substrates into the PAMAM and DPPG solutions for 10 min., respectively. After each immersion, the films were rinsed with pure water. The concentration of the solutions was set at 1 g/L for PAMAM and 1 mM for DPPG. The formation of PAMAM/DPPG multilayers was confirmed by Fourier transform infrared spectroscopy (FTIR). The films exhibited a very flat morphology, as visualized by atomic force microscopy (AFM), with a roughness of 5 nm for a 3-bilayer film. Film thickness was estimated by AFM to be ca. 2.8 nm per PAMAM/DPPG bilayer.

A-P 068

THERMAL AND MECHANICAL PROPERTIES OF CONDUCTIVE NANOCOMPOSITES INCORPORATING POLYMER-MODIFIED CARBON BLACK

V. Zucolotto - IFSC, Grupo de Polímeros, IFSC, Av. Trabalhador São Carlense, 400, São Carlos, SP, Brazil, CP 369; J. Avlyanov - Eeonyx Co.; R. Gregório Jr. -DEMA; L.H.C. Mattoso - Embrapa

Conductive composites incorporating poly(vinylidene fluoride) PVDF or triblock copolymer poly(styrene-b-ethylene-co-butylene-b-styrene) SEBS and a novel conducting polymer-modified carbon black (CPMBC) additive were produced by melting process. CPMBC additive comprises conductive nanoparticles made via deposition of polyaniline or polypyrrole on carbon black particles. The composites were produced in a high temperature mixer and then hot pressed in the form of homogeneous flexible films. Electrical conductivity in the order of 10⁻² S/cm could be achieved with low contents of the conductive filler. The addition of CPMBC is advantageous to the melt processing of the composites reducing the melt viscosity in comparison to the addition of pure carbon black. It was shown that for the SEBS based composites, both strength at break and yield point decreases with the increment of the polyaniline content on CPMBC formulation. The conductivity is quite stable at high temperatures, even when the samples are exposed to 150°C for several days. Thermogravimetric analyses (TGA) showed that the composites have an excellent thermal stability up to temperatures of about 350°C, which is highly desirable during the melt processing. For PVDF-based nanocomposites, in particular, the incorporation of the nanostructured additive allows the achievement of PVDF- b phase in a one-step process, when the nanocomposites are quenched from the melt.

A-P 069 RANDOM FREE ENERGY BARRIER MODEL APPLIED TO ALTERNATING CONDUCTIVITY OF N-TYPE mc-Si:H FILMS
A. M. Nardes, E.A.T. Dirani, R.F. Bianchi, A.M. Andrade, F.J. Fonseca - LME, PSI, EPUSP, Universidade de São Paulo, P.O. Box 61548, 05424-970, São Paulo, SP, Brazil

We report the alternating conductivity, $s^*(f) = s'(f) + i s''(f)$, studies of n-type mc-Si:H films obtained by conventional plasma enhanced chemical vapor deposition technique (PECVD) at temperature deposition equal to 200, 220 and 250 °C. The $s^*(f)$ results showed to be a behavior characteristic similar to that of conduction in a solid disordered medium. While $s'(f)$ shows a plateau at low frequency, which defines the d.c. conductivity, for higher frequencies, s' diminishes quasi-linearly with f . Usually these two regions merge smoothly around a critical frequency f_0 with a peak in s'' . An equivalent complex impedance and alternating conductivity expressions were used to explain such an electrical behavior, in which the bulk properties of the material were represented through, respectively, the Cole-Davidson approach and the Random Free Energy Barrier model. The broad spectrum of carriers relaxation time and d.c. impedance of the material were then achieved, and the electrical and structural properties are presented. Some conclusions regarding the correlation between electrical and structural properties are presented for the considered assumptions. The structural properties of the films have been studied by Raman and infrared spectroscopies techniques, while the electrical properties by a.c. and d.c. conductivities measurements.

A-P 070 PARAMETERS OPTIMIZATION OF A ANALYTICAL SIMULATOR FOR NANOTRANSISTORS
O. Paranaíba, M. A. C. Pacheco - PUC-Rio, R. Jardim Botânico 616 pat.203 Bl. A

MOSFET channel lengths continue to shrink rapidly towards the sub-10nm. The use of high-mobility channel materials open up the possibility of near-ballistic MOSFET operation. The use of a simulator, grounded in a simple analytical theory for ballistic transistors, can be employed to explore applications to MOSFETS and to unconventional field-effect Transistors. This paper proposes evolutionary techniques to optimize MOSFET's parameters that can secure the correct functionality of the device avoiding undesirable problems. Evolutionary computing is the application of evolutionary theory within the computing environment. It is inspired by Darwin's theory of evolution. Algorithm begins with a set of solution called population. Solutions from one population are taken and use to form a new population. This is motivated by the idea, that the new population will be better than the old one. Solutions are selected according to their fitness, the more precious they are the more chances the have to reproduce. This is repeated until some condition is satisfied. In this work we employed the evolutionary approach to gain correct values for three parameters (gate control, drain control and Fermi level) that secure the correct functionality of the desirable nanoMOSFET. The simulations showed that this is an efficient method to reach the correct values and consequently a nanoMOSFET with the desirable features.

A-P 071 THERMO-OXIDATIVE DEGRADATION OF PP/BENTONITE SYSTEMS
F.G. Ramos Filho, T.J.A. Melo, M.S. Rabello, S.M.L. Silva - CCT/UFCEG, DEQ, Av. Aprígio Veloso, 882, 58109-970, Bodocongó, Campina Grande/PB, Brazil

The melt intercalation method was employed to prepare polypropylene (PP)/ natural clay and modified clay. A sodium bentonite - Brasgel (BRG) - was used as filler in contents of 1 and 3 wt%. The BRG was modified organically with quaternary salt of ammonium - trimethyl cethyl ammonium bromide salt (Cetremide). The systems were prepared in a counter-rotating twin-screw Haake extruder at 180 e 210°C. To evaluate the influence of the modification of the clay and the processing temperature in the thermo-oxidative degradation of these systems, the samples were aged in a termooxidative atmosphere in an air forced oven at 110 °C for 94 h. During the aged, the presence of carbonyl groups was followed by spectroscopy in the infrared (FTIR). The analyses of FTIR, diffraction of rays-X (XRD) and thermogravimetric analysis (TGA) showed that the organofillization of the clays had taken place. The systems obtained with 3 wt% of the organically modified clay (organoclay) degraded less than the systems obtained with natural clay when these systems were obtained at 210°C. On the other hand, the same systems prepared at 180°C with organoclay had larger degradation. The systems with 1 wt% of clays did not degrade. These results showed that the filler content, organic modification of the clay and processing temperature influenced the thermo-oxidative degradation of the systems studied.

A-P 072 240° DISCLINATION BN CONES: A TIP TERMINATION STUDY
M. Machado, P. Piquini, R. Mota - UFSM, Laboratório de Estrutura Eletrônica dos Materiais (Leelmat), Faixa de Camobi, Km 9, Campus Universitário, Santa Maria - RS, CEP 97105-900, Brazil

The questions involving the 240° disclination BN nanocones tip termination closure are further analyzed through first-principles calculations based on the density-functional theory. Two possible cones terminations are studied: (a) four pentagons at the apex and termination in two three-coordinated atoms, presenting two homonuclear bonds, and (b) two squares and two hexagons at the apex and termination in two three-coordinated atoms presenting no homonuclear bonds. The cones binding energies are calculated and compared in order to determine the most energetically favored cone. The different cones are then submitted to external electric fields, applied along the axis, ranging from zero up to 1.7 V/Å with the charge distributions being analyzed. It is show that both cones are energetically competitive. The charge distributions and the densities of states, in response to the application of the external electric field, shown that the BN cones are promising candidates to be used as probes in electronic microscopy as well as field emitters.

A-P 073 SYNTHESIS AND CHARACTERIZATION OF V2O5 XEROGEL/POLY(ETHYLENE OXIDE) COMPOSITE
E. M. Guerra, H. P. Oliveira - FFCLRP-USP, Av. Bandeirantes 3900, 14040-901 Ribeirão Preto (SP), Brasil.

In recent years, intercalation compounds and synthesis of polymer/inorganic materials have been frequently studied. V2O5 xerogel is used as intercalation material as well it improved the reversibility of insertion/extraction of Li+ ions. However, PEO intercalation into the matrix has been studied in the development of lithium batteries. In this work, we report of the synthesis of V2O5/PEO and the effect of modification with poly(ethylene oxide) on the reversibility of insertion/desinsertion of Li+ ion in V2O5 xerogel films. The XDR pattern of the composites exhibit 001 reflections indicating an increase of the interlayer spacing with the insertion of the polymeric species inside the matrix. The stacking regularity primarily is similar with higher polymer load according to the coherence length measured along the layer stacking direction. Probably, the composite material is assembled by self-organization of the PEO and the inorganic units through a stable weak non-covalent and non-directional guest-host interaction. The electrochemical property of the composite is affected by the steric hindrance due to the presence of organic polymer in the interlayer domain. As a result, the decrease of the voltammetric charge can be related to the higher difficulty of the Li+ ions to reach the internal areas of the composite.

A-P 074 SYNTHESIS AND CHARACTERIZATION OF CONDUCTIVE POLYMER FILM OBTAINED BY LANGMUIR-BLODGETT DEPOSITION
H. S. Mansur, R. L. Oréface, J. E. Oliveira - UFMG, Rua Espírito Santo, 35 - Sala 316 - Belo Horizonte - MG - Brasil

In the present work, we have deposited poly aniline (PANI) molecular films through Langmuir-Blodgett deposition method. Several layers were deposited and fully characterized by transfer ratios, UV-visible spectroscopy and ATR-FTIR spectroscopy. A sensor was also developed via deposition of molecular layers of PANI onto quartz crystal microsensors. The results have clearly indicated that single and multilayer molecular films were obtained via LB route. Also, crystal sensor frequency alterations due to the polymer layers uptake was be used as a characterization method for monitoring PANI polymer deposition quality.

A-P 075 NON-SILICON COMPUTATION
C. C. Santini, M. A. Pacheco - PUC-RIO, ICA, Rua Marquês de São Vicente, 225, Rio de Janeiro, Brazil, CEP: 22453-900

Molecular electronics, from the bottom-up approach, aims the construction of electrical devices to implement computation using individual or small collection of molecules, offering an alternative pathway to construct nanoscale circuits. These circuits have the potential to reduce device size and fabrication costs, by several orders of magnitude, relative to conventional CMOS. However, the construction of these molecular devices presents a large number of design and fabrication challenges, such as the synthesis of molecular components with a high degree of precision and the assembly into regular structures. In this sense, this paper proposes a circuit architecture based on Evolvable Hardware (EHW), that could benefit from the randomness associated with device variations. Evolvable Hardware encompasses a particular class of algorithms which employs some aspects of natural evolution as metaphors. These algorithms, called Evolutionary Algorithms – EAs, have been widely applied to complex optimization problems, such as the synthesis of a circuit that satisfies a certain specification. SPICE simulations of circuits based on resonant tunneling diodes (RTDs) with a current-voltage response similar to that of a Tour-Reed molecular diode are presented in order to evaluate the proposed architecture based on EHW.

A-P 076 EFFECTS OF ORGANOPHILIC CLAY ON THE MECHANICAL PROPERTIES OF ACRILIC ACID POLYPROPYLENE/POLYPROPYLENE
T. J. A. Mélo, A. W. B. Rodrigues, H. S. FERREIRA, G. A. NEVES, H. C. FERREIRA - UFCG, Av. Aprígio Veloso, 882 - Bodocongó Campina Grande-PB

In this work was used a montmorillonite modified clay in the development of nanocomposites with polypropylene (PP) mixed with 10 wt% of PP grafting with acrylic acid (PP-g-AA). Two masterbatch in a closed mixer with 50% of clay had been prepared (AST– clay without treatment and another ACT – with treatment) and 50% of PP. The masterbatch had been diluted in concentration of 1wt% in polypropylene during the processing in a twin-screw extruder in the temperature of 210°C and 60 rpm. The influence of AST and ACT in the mixture was evaluated through the mechanical properties under traction (modulus, yield strength and elongation at break). The results had shown that 1wt% of AST in the matrices of PP and PP/PP-g-AA (90/10) decreases the mechanical properties, comparative to the pure matrices. On the other hand, the incorporation of clay ACT, treated and modified with the quaternary ammonium salt, kept the values of the modulus and yield strength and increased the elongation at break significantly. In the system using the matrix of PP/PP-g-AA the increase in the elongation at break was of more than 400%. This increase can be related to one better intercalation of polymer between the particles of clay and greater exfoliation the nanometer-thick silicate platelets within the polymer matrix.

A-P 077

VALUATION OF THE CATALYSTS OF NIQUEL ON L ZEOLITICAL SUPPORT

O. M. S. Ribeiro, M. D. Oliveira, A. S. Araujo, A. C. Gonzaga, S. M. S. Ribeiro, M. G. F. Rodrigues - UFCCG, R. Aprigio Nepomuceno, 296, Jardim Paulistano, Campina Grande, Paraiba, Brazil, CEP 58105285

The L zeolite doesn't possess a direct catalytical performance in the form of potassium in which is synthesized, therefore it does not supply the active sites, however influences of the striking form the electronic state of the metallic particles and restricts the formation of defined products due to geometry of characteristic pore. Therefore, its more common use in catalysis is as support for metals with the hydrogenation - dehydrogenation capacity like platinum. The metal supported in catalysts generally is prepared by impregnation or ion exchange on a support of great superficial area as the silica or alumina. Consequently, this research objectived to prepare catalysts of the type Ni/L zeolite. The samples were prepared by the method of competitive ion exchange and after were calcined. For characterization of the samples were used the techniques of X-Ray Fluorescence (XRF), X-Ray Diffraction (XRD) and Differential Thermal Analysis and Thermogravimetric Analysis (DTA/TGA).

A-P 078

DRY THERMAL OXIDATION OF SiC AND ITS RELATIONSHIP WITH C CLUSTERS

G.V. Soares, F.C. Stedile - UFRGS, Laboratório de Superfícies e Interfaces Sólidas, Rua Bento Gonçalves 9500, Porto Alegre, Brazil CP15051; C. Radtke - DSM-DRECAM-SPCSI-SIMA; I.J.R. Baumvol - UCS

SiC is a wide band gap semiconductor, possessing desirable properties for devices operating in extreme conditions. Furthermore, SiC is the only compound semiconductor that can be thermally oxidized forming a film of SiO₂. Despite all these advantages, the electrical characteristics of devices built on SiC are worse than those prepared on Si. This fact hampers the wide utilization of this semiconductor in the fabrication of power devices. In this work thermal oxidation of 6H-SiC was investigated by means of isotopic tracing and narrow nuclear reaction profiling techniques. The mechanisms of oxygen transport and incorporation were accessed by sequential oxidations in dry O₂ enriched or not in the ¹⁸O isotope and subsequent determination of the ¹⁸O profiles. After sequential ¹⁶O₂/¹⁸O₂ or ¹⁸O₂/¹⁶O₂ oxidations of SiC, the ¹⁸O profiles were seen to be markedly different from those observed in Si oxidation, which led to the identification of different mechanisms of oxygen incorporation and transport. The gradual nature of the SiO₂/SiC interface was also evidenced by the ¹⁸O depth distributions in samples oxidized in a single step in ¹⁸O-enriched O₂. A probable explanation for this gradual SiO₂/SiC interface is shown to be the formation of C clusters during oxidation, which are also related to the density of electronic states of the interface. Thus, understanding and controlling the formation of C clusters is a possible way of improving the electrical characteristics of these devices.

A-P 079

XMCD EXPERIMENT ON THE INTERFACES OF Fe/Cr MULTILAYERS

W. Alayo, A.D. Alvarenga, V.P. Nascimento, M. Tafur, P.E. Munayco, E. Baggio-Saitovitch - CBPF, Rua Dr. Xavier Sigaud 150, 22290-180, Urca, Rio de Janeiro, Brazil

The Fe/Cr multilayers systems have been widely studied since the discovery of the oscillatory magnetic coupling. Applications on spin-valves devices have renewed the study of AF coupled multilayers with the substitution of the original AF pinning layer by a non magnetic Cr buffer layer. The coercivity of the FM layer increases due to the interaction effect with the Cr layer, generating a spin-valve effect, instead of an exchange-bias generated by an AF layer. The interfacial spins configuration is very important for the understanding of these systems. Here we report on X-ray Magnetic Circular Dichroism (XMCD) experiments realized at the D08A-SGM beam line of LNLS-Brazil investigating the magnetic moments of Fe and Cr at the interfaces of Cr/Fe multilayers produced at the Thin Films Laboratory of CBPF by magnetron sputtering. The multilayers: Cr 30Å/[Fe 50Å/Cr 27 Å]₂₀ were characterized by Magneto resistance and SQUID. The values of the magnetic orbital and spin moments were obtained from the XMCD experiments performed as a depth profile from the top of the last Cr layer to the Cr/Fe interface. At the middle of the Cr layer the dichroism was 4.9% and at the interface Cr/Fe, it was 7.8%, while for Fe it was 9.5% . The magnetic moments of Fe and Cr showed an antiparallel alignment. The induced moment for Cr was -0.02 Bohr magnetons, whereas the Fe moment was 1.4 Bohr magnetons.

A-P 080

MAGNETIC PROPERTIES OF SPIN VALVES INTERFACES STUDIED BY X RAY MAGNETIC CIRCULAR DICHOISM

M. Tafur, A.D. Alvarenga, V.P. Nascimento, W. Alayo, P. E. Munayco, E. Baggio-Saitovitch - CBPF, Rua Dr. Xavier Sigaud 150, 22290-180, Urca, Rio de Janeiro, Brazil; A. Biondo - DFCCE-UFES

Spin valve (SV) multilayers based on the giant magnetoresistance (GMR) effect are being applied to magnetic recording heads and magnetic sensor systems. Actually several SV configurations are used and being developed, in order to achieve larger values of GMR. Here we report on the characterizations of SV systems where a nano-oxide layer (NOL) has been introduced into the free layer to enhance the GMR as has been recently reported. The knowledge of the alignment of the magnetic spins at interfaces, along with investigations of the role of orbital magnetism, are thus of great importance. The SV were prepared at the Thin Films Laboratory of CBPF/MCT-RJ, using a magnetron sputtering system: Si(100)/WTi/NiFe/FeMn/NiFe/Cu/NiFe/WTi and Si(100)/WTi/NiFe/FeMn/NiFe/Cu/NiFe/NOL/NiFe/WTi. These systems were characterized by measurements of magnetoresistance and magnetization using a SQUID. Measurements of X-ray Absorption and X-ray Magnetic Circular Dichroism (XMCD) were performed in order to study the spins at the interfaces of the free layers with and without NOL. The experiments were performed at the D08A-SGM beam line of the LNLS-Brazil. For both samples, the Fe spin moments show a decrease from the top to the interfaces, while the Ni moments remain constant. For the orbital moments, the behavior is distinct for the samples with and without NOL.

A-P 081 THEORETICAL STUDY OF ABSORPTION OF ATOMIC SILICON ON SINGLE VACANCY CARBON NANOTUBE

L. B. da Silva, R. Mota - UFSM, Laboratório de Estrutura Eletrônica dos Materiais, Fx. de Camobi, km 9, prédio 13, Santa Maria, Rio Grande do Sul, Brazil, CEP 97105-900; S. B. Fagan – UNIFRA; A. Fazzio, A. J. R. da Silva - USP

Carbon nanotubes are very promising structures for developing of new technologies due to their peculiar physical and chemical properties. The possibilities of carbon nanotubes applications can be considerably increased by the sidewall functionalization. One of the most studied forms of sidewall functionalisation is through substitutional doping, where carbon atoms are replaced by impurities atoms, such as boron or nitrogen. Actually, the use of silicon as dopant leads to a considerable gain in optimizing physical and chemical properties, specially chemical reactivity. Although, the production of doped carbon nanotubes in a controlled way is still a challenge issue. Carbon nanotubes produced by CVD techniques present usually single vacancies, what are very reactive and could be used as an absorption site for of silicon atoms, leading to the desired doped tubes. In order to understand the mechanisms involved in that process, we realize a study of the Si-absorption over a single vacancy in a (8,0) single-wall carbon nanotube using computational simulations in the framework of density functional theory. We analyze structural, electronic and energetic properties of the system, performing a fully characterization and proposing direct applications, contributing for a better understanding of the involved reactions and the process optimization.

A-P 082 ENERGY SHELL STRUCTURE PROPERTIES OF CHEMICALLY DISORDERED INAS QDs

F. G. G. Hernández, E. Ribeiro, G. Medeiros-Ribeiro - LNLS, Laboratorio Nacional de Luz Sincrotron, Polo II de Alta Tecnologia de Campinas, R. Maximo Solfaro 10000, Campinas. Sao Paulo, Brazil, Caixa Postal 6192 - CEP 13084-971

The photoresponse of quantum dots (QDs) must be investigated as an important step in devising structures that allow the assessment of a particular quantum state. Interesting physical phenomena like Rabi oscillations of excitons have been successfully observed in InAs/GaAs QDs via photocurrent measurements. Structures containing QDs embedded between a back contact and a gate on the sample surface produce a photodiode, that can allow as well a variable field to be established at the QDs. Applying a DC bias on the device enabled the sequential loading of electrons filling up the QD shells while increasing the electric field. These phenomena allowed the observation of the Quantum Confined Stark Effect. We have performed photocurrent and capacitance studies of InAs/GaAs self-assembled quantum dots using n-i-Schottky diodes. We show that the PC spectroscopy allows to obtain the localization energies for the s, p, d and f levels, in a reasonable agreement with a Fock-Darwin description for the QDs. The lateral confining potential characteristic energy was about 50 meV in agreement with magneto-capacitance spectroscopy. In a further experiment aimed at investigating the energy shell structure symmetries, photocurrent spectra with linearly polarized light displayed the influence of the In redistribution as a chemical disorder factor on the interband transition selection rules for different growth techniques.

A-P 083 USE OF HIGHLY NON-POLAR PLASMA DEPOSITED THIN FILMS FOR PROTECTION OF FLEXIBLE SUBSTRATES

A.T. de Carvalho, R.A.M. Carvalho, N.R. Demarquette, M.L.P. da Silva - EPUSP, Laboratório de Sistemas Integráveis-Av: Professor Luciano Gualberto, 158 trav 03 sala A1 -46, CEP 05508-900-

Hexametildisilazane (HMDS) plasma polymerized thin films obtained on low frequency can be used to make adsorbent films and hydrophobic surfaces. Therefore the aim of this work is to verify the hydrophobicity and the adsorption properties of HMDS thin films obtained in 13.56 MHz. The substrates used were: silicon for infrared spectroscopy and resistance for O₂ reaction, polypropylene (PP) for ultraviolet (UVA/UVC) tests, piezoelectric quartz crystal and reactants in large scale of polarity for adsorption tests. It was used 3000 Å thickness films. The films showed good adhesion in all substrates. Infrared analysis showed CH_n, Si-CH₃, Si-N-Si and Si-CH₂-Si. Contact angle measurements with water showed a hydrophobic surface. UVA/UVC tests showed cross-linking on carbonic radicals and SiCH₂Si formation. PP samples showed color changes only after two weeks exposure to UVC. Adsorption tests showed that all organic reactants were adsorbed but not water. Plasma etching (PE) using O₂ showed that even after 15 minutes of exposure the films do not change your hydrophobic characteristic, however oxidation occurs. Intermixing showed that it is not possible to oxidize the surface continuously. Therefore, HMDS films can be used for ultraviolet protection on flexible organic substrates, such as PP. The films are useful in sensor and/or preconcentrator development due to their adsorption properties and in spatial applications due to resistance for O₂ attack in hostile conditions, such as PE.

A-P 084 SPECTROSCOPIC CHARACTERIZATION OF POLYMERIZED ANILINE IN MCM-41-Cu(II)

C. M. S. Izumi, M. L. A. Temperini, V. R. L. Constantino - IQ-USP, Departamento de Química Fundamental, Instituto de Química, Universidade de São Paulo, Av. Prof. Lineu Prestes, 748, CP 26.077, CEP 05513-970, São Paulo, SP, Brazil

The encapsulation of conducting polymers in well-defined hosts is a promising way to improve and control the properties of the polymers. One route to obtain these nanocomposite materials is the use of a host containing internal oxidants such as transition metal ions. Among others conducting polymers, polyaniline (PANI) has been investigated with particular interest due to its environmental stability and relatively high electrical conductivity. In this work, the polymer formed by the oxidative polymerization of aniline in MCM-41, a mesoporous silica with hexagonal array, containing Cu(II) (MCM-41-Cu), has been characterized using UV-Vis, FTIR, Resonance Raman and N K-edge XANES spectroscopies. In order to compare the spectroscopic data of free polymer with those of confined polymer in MCM-41-Cu, free polyaniline was synthesized using: (i) persulfate as oxidant in acidic aqueous medium; (ii) Cu(II) in acidic aqueous or in acetonitrile/water media. The presence of characteristic segments of conventional doped PANI (head-to-tail segments) was confirmed using Resonance Raman spectroscopy. XANES data suggest the presence of cyclic segments, phenazine like rings, in PANI-Cu-MCM. These segments are also present in PANI obtained using Cu(II) in acetonitrile/water media but are not observed in PANI synthesized in acid aqueous medium using persulfate. These results show that synthetic parameters such as solvent and oxidant can modify the chromophoric segments in PANI chain structure.

A-P 085 MAGNETIC PROPERTIES OF THE GRANULAR ALLOY Fe₁₀Ag₉₀ AS A FUNCTION OF ANNEALING TEMPERATURE

J. M. Soares - UFPE, Av. Professor Luiz Freire, s/n Cidade Universitária, 50670-901, Recife-PE; J. H. de Araújo, F. A. O. Cabral, T. Dumelow - UFRN; M. M. Xavier Jr. – UERN; J. M. Sasaki - UFC

Granular Fe₁₀Ag₉₀ alloys have been prepared using the sol-gel process, sintered at a temperature of 300 °C and annealed at temperatures between 400 and 700 °C. The mean size of the iron particles, obtained from x-ray diffraction, is 30.0 ± 0.7 nm. Due to the existence of a distribution of particle sizes in these samples, both blocked (BL) and superparamagnetic (SPM) particles are present simultaneously, as confirmed by magnetization measurements at ambient temperature, even though the critical diameter of Fe is 16 nm. The coercive field H_c is two orders of magnitude greater than that of bulk iron, showing the presence of blocked single-domain particles. The hysteresis curves do not saturate in fields of up to 1 T, showing the additional contribution of SPM particles. Measurements of AC susceptibility as a function of temperature reveal a phase transition above 776 °C, indicating the presence of particles exhibiting bulk behavior, in the particles annealed above 550 °C. Their presence is due to an atomic diffusion process between the grains, forming bulk-like multiple-domain Fe particles having Curie temperatures near that of bulk alpha-Fe (T_c = 770 °C).

A-P 086 THE EFFECTS OF THE SIDE CHAIN CONFORMATIONS IN THE PROPERTIES OF IONIC LIQUIDS

V. M. L. dos Santos, R. L. Longo - UFPE, Laboratório de Química Teórica e Computacional. Departamento de Química Fundamental, Cidade Universitária Recife, Brazil, CEP 50.740-540

Green chemistry demands the replacement of volatile organic solvents, which can be accomplished by ionic liquids. These solvents are salts formed with an organic cation and inorganic anion. They are non-volatile, nonflammable and have chemical and thermal stability, high ionic conductivity and a wide electrochemical potential window. The most common ionic liquid is BMI-X, where BMI⁺ is the 1-n-butyl-3-methylimidazolium cation and X⁻ is an anion (chloride or tetrafluoroborate). The conformational analysis of the n-butyl side chain of BMI⁺ was performed with ab initio methods, that also yielded atomic charge fitted to the electrostatic potential. The OPLS Lennard-Jones parameters for united atoms were used with the calculated atomic charges for the Monte Carlo simulations of BMI-X, with BMI⁺ in three distinct conformations of the n-butyl chain. It was observed that the flexibility of the n-butyl chain is probably the main reason for the disorder of these salts leading to a liquid state at room temperature and atmospheric pressure.

A-P 087 EFFECT OF THE CALCINATION TEMPERATURE ON THE STRUCTURAL AND MAGNETIC PROPERTIES OF NANO-PARTICLES of La_{2/3}Sr_{1/3}MnO₃

M. L. Moreira, J. M. Soares, W. M. de Azevedo, A. R. Rodrigues, F. L. A. Machado - UFPE, Av. Professor Luiz Freire, s/n, Cidade Universitária, 50670-901, Recife-PE

In this work, powders of La_{2/3}Sr_{1/3}MnO₃ manganite were prepared using a Pechini process. The dried gels powders were split into five samples that were calcinated at 873 K, 973 K, 1073 K, 1173 K and 1273 K. After been calcinated, the structural properties of the samples were characterized by x-ray diffraction (XRD) and transmission electron microscopy (TEM). The magnetization and magnetic susceptibility of the samples were measured from room temperature up to 450 K. The XRD indicated the presence of a small amount of an amorphous phase in sample calcinated at 873 K which is not present in the one calcinated at 1273 K. The XRD yielded grains size that grows monotonically from 20 nm to 90 nm when the calcinations temperature is increased. These results were confirmed by TEM. The magnetic data showed that both the saturation and remanent magnetizations does also increases monotonically with the calcinations temperature. The transition temperature from the ferromagnetic to the paramagnetic phase increases from 313 K for the sample calcinated at 873 K to nearly constant value of 361 K obtained for samples calcinated at and above 1173 K. The above results show that the calcination temperature is an important parameter for tuning the structural and magnetic properties of the manganites.

A-P 088 SIZE DISTRIBUTION WITH SUPERPARAMAGNETIC AND BLOCKED PARTICLES IN FeAg GRANULAR ALLOY

J. M. Soares - UFPE, Av. Professor Luiz Freire, s/n, Cidade Universitária, 50670-901, Recife-PE; J. H. de Araújo, F. A. O. Cabral, T. Dumelow - UFRN, M. M. Xavier Jr. - UERN, J. M. Sasaki - UFC

A method of fitting experimental magnetization curve of magnetic nanoparticles with a size distribution that contain superparamagnetic and blocked particles is proposed. Langevin and hyperbolic tangent functions weighted with a log-normal particle size distribution are used to fit the magnetization curves of a series of Fe₁₀Ag₉₀ granular alloys produced by a sol-gel method in different chemical conditions. The average Fe particle diameters calculated from the fits are in agreement with those obtained by Xray diffraction. In which the larger the distribution width the higher the coercive field.

A-P 089 DIELECTRIC AND FERROELECTRIC PROPERTIES OF Ba_{1-x}Ca_xTiO₃ DENSIFIED CERAMIC OBTAINED FROM NANOPOWDERS

R. S. Silva, A. C. Hernandez - CCMC - IFSC - USP, Grupo Crescimento de Cristais e Materiais Cerâmicos, São Carlos, São Paulo, Brazil, Cx Postal: 369, 13560-970; M. H. Lente, J. A. Eiras - DF - UFSCar

Barium titanate is one of the most studied and applied ferroelectric materials as, for instance, in capacitors, transducers and electro-optics devices. Modified BaTiO₃ compositions have been studied aiming the optimization of its physical properties. Among those modified compositions, the Ba_{1-x}Ca_xTiO₃ (BCT) system has attracted considerable attention because of its better electromechanical behavior, the increased temperature range of the tetragonal phase, and the inhibition of the formation of the unwanted hexagonal phase of BaTiO₃. In the present work, we have studied the production of Ba_{0.99}Ca_{0.01}TiO₃ (BCT1) and Ba_{0.95}Ca_{0.05}TiO₃ (BCT5) nanopowders through Pechine's method, and also determined the experimental conditions to obtain densified ferroelectric ceramics. We have used a CO₂ laser (in mode continuo) and an electric oven as heating source. The nanopowders (average grain size of 40 nm) were calcined at 800°C/2h in air atmosphere, and a unique crystalline phase – BCT – was obtained and confirmed by XRD. The BCT1 and BCT5 densified ceramics presented a density higher than (94 ± 1)% with an average grain size <1µm. The dielectric constant around 2000 at room temperature was measured with a Curie temperature at 110°C. The spontaneous polarization was 2.5µC/cm² and 4µC/cm² for BCT1 and BCT5, at 10Hz, respectively.

A-P 090 CHEMISTRY AND CATALYTIC APPLICATIONS OF CLAYS AS A NOVEL CATALYSTS

N. L. V. Carreño, R. F. Silva, L. S. Barreto, I. F. Gimenez - UFS, Departamento de Química, Marechal Rondon s/n, Jardim Rosa Elze, São Cristovão-SE, 49100000; L. P. S. Santos – UFSCAR; L. F. D. Probsts, H. V. Fajardo - UFSC, R. M. Almeida UFS

Novel catalysts have been prepared, based on acid-activated mineral support (a natural clays from Sergipe state), the natural clays were modified by the high-energy mechanical milling, thermal treatment, impregnation process and chemical doped with rare earths. The acid surface of these compounds were strongly influenced by the doping and the time of mechanical milling (amorphization process). Such milling leads to the formation of nanocrystalline materials. The influence of the mechanical processing of these compounds was investigated by means of BET, XRD, TG, RAMAN, IR-VIS, SEM, and catalytic characterization (for dioxide reforming of methane). The significant change of active surface was observed and directly related to physicochemical of catalysts.

A-P 091 SYNTHESIS AND CHARACTERIZATION OF (Fe, Ni/C) NANOCOMPOSITES PROCESSED IN THE THIN FILMS

N. L. V. Carreño, R. F. Silva, L. S. Barreto, A. Martins, I. F. Gimenez, R. C. F. Alves Santos - UFS, Departamento de Química, Marechal Rondon s/n, Jardim Rosa Elze, São Cristovão-SE, 49100000; L. P. S. Santos – UFSCAR; L. F. D. Probsts, H. V. Fajardo - UFSC, R. M. Almeida UFS

Fe and Ni-nanoparticles embedded in a amorphous carbono matrix, respectively, thin films were prepared by the polymeric precursor method. Thin films were deposited on Si (100) substrates by dip coating and annealed in the 400oC to 700oC range in an N₂/H₂ atmosphere. X-ray diffraction (XRD), scanning electron microscopy (SEM) and atomic force microscopy (AFM) were used for the microstructural characterization of the thin films.

A-P 092 THE HYDROGEN EFFECT ON AMORPHOUS GALLIUM ARSENIDE FILMS PREPARED BY RF-MAGNETRON SPUTTERING TECHNIQUE

J. V. Lopes, R. Bustamante - IPD - UNIVAP, Laboratório de Filmes Finos, Avenida Shishima Hifumi, 2911- Urbanova , São José dos Campos - SP, CEP:12244-000

This work presents the effect that the intentional incorporation of hydrogen produces on the structural and optical properties of amorphous Gallium Arsenide. The a-GaAs samples were prepared using to the rf-magnetron sputtering technique. Conditions preparations have been developed to obtain a-GaAs samples, without hydrogen, with excellent optical and electronic qualities. Using this technique, the a-GaAs state of the art present a forbidden band of 1.4 eV (E₀₄), Urbach energy of 110 meV and good stoichiometric (50 at.%) and room temperature dark conductivity of 3,2 x10⁻⁵ (Wcm)⁻¹. Hydrogenated a-GaAs samples were prepare introducing hydrogen in the deposition chamber. Maintained fixed the conditions preparation to obtain a-GaAs samples with the properties described above, it was varied the hydrogen flux into the deposition chamber. The hydrogen flux was varied from 0 sccm to 36 sccm. After the preparation of hydrogenated a-GaAs samples, it was characterized with the infrared transmission and Raman spectroscopies, and X-ray diffraction spectrometer. It was observed that the hydrogen present bond to As and Ga, and low hydrogen dilution induces the formation of nano-crystals of GaAs observed by Raman and x-Ray spectroscopies. The nano-crystals observed are the order of 68 Å inside of the amorphous network.

A-P 093 STRUCTURAL EFFECTS ON CR AND CRFE SAMPLES PRODUCED BY ION IMPLANTATION

R. M. N. Miranda, Centro Universitário FEEVALE, Grupo de Ensino em Materiais RS 239, 2755, Novo Hamburgo • RS • CEP 93352-000; C. Heck, A. Chayahara, Y. Horino, R. Funahashi - AIST Kansai; M. G. M. Miranda, M .N. Baibich - UFRGS

In this work we have produced both pure Cr samples and nanostructured Cr with one thin layer of Fe at half sample by depositing highly pure Cr and Fe onto SiO₂/Si (100) substrates, resulting in 950 Å films. Subsequently, in the pure Cr sample we implanted Fe into two layers centered around 650 and 330 Å from the outer surface. Additional Ar bombardment was used in the Fe-deposited samples to obtain the same amount of defects as that obtained from Fe implantation. Analysis of the structural and transport properties of these films indicates that the implantation process introduces defects in Cr, forcing accommodation to take place both during and after the process, inducing the segregation of these species. This gives rise to nanostructured Fe in much faster time scales than with conventional processes. Chromium is an antiferromagnet with an incommensurable spin wave in bulk, and Fe clusters within Cr would create some sort of cluster glass. As can be seen from the electrical resistivity, only the Fe-implanted samples show a clear minimum at fairly high temperatures. This minimum is moved swiftly by moderate anneals, which tends to favour the view that Fe implantation introduces localized defects that enhance mobility in these materials.

A-P 094 MICROWAVE TUBULAR FURNACE: A NEW TOOL FOR HEAT TREATMENT OF MATERIALS

D. Keyson, E. Longo, J. A. Varela - LIEC/CMDMC/UFSCAR, Rod. Washington Luiz, Km 235

The use of microwaves in chemical synthesis has acquired a great interest in inorganic and organic chemistry during the last years. Moreover, domestic microwave ovens have been used in the processing of several materials, such as technological ceramic. Besides, the use of microwaves in relation to the conventional heat treatment saves a lot of time and even material properties can be enhanced. Several works described the microwave heat treatment of thin films and there is a lack of such experimental array to perform this treatment in powders. It became more critical when you work with powders prepared by polymeric precursors. In this sense, we have built a microwave tubular furnace, which should be used to heat-treated bulk materials and thin films. Through this furnace we have synthesized the α and γ alumina that were prepared by polymeric resin. For both samples were obtained with single-phase by using lower heat-treatment times than those reported in literature. X-ray diffraction and Scanning Electronic Microscopy characterized the powders. The final results indicated that this procedure can be useful in the synthesis of a great variety of oxides.

A-P 095 TEXTURAL, STRUCTURAL AND MORPHOLOGICAL CHARACTERIZATION OF ALUMINA AEROGELS DURING HEATING

C. F. Diniz, K. Balzuweit, N. D. S. Mohallem - UFMG, Laboratório de materiais nanoestruturados, Departamento de Química, Av. Antonio Carlos 6627, Belo Horizonte, MG

The recent growth in the field of porous and nanometric materials prepared by non-conventional processes has stimulated the search of new applications of alumina properties, which also depend on the alumina phase. Porous alumina, formed principally by γ -phase, is an excellent adsorber, and has been used as filters, catalysts, membranes, molecular sieves, and casting molds, among others. In particular, aerogel is a class of porous material that presents unique characteristics. In this work, alumina aerogel was synthesized by hydrolysis of aluminum isopropoxide followed by gelation and drying under hypercritical condition. The influence of temperature on structural, textural, and morphological properties of the material was studied by powder X-ray diffraction, infrared spectroscopy, scanning electronic microscopy, nitrogen adsorption, and thermal analysis. The as-prepared aerogel (300°C) was formed by boehmite crystallites, whose structure collapsed after heating, yielding δ and η alumina nanophases at 1200°C. This alumina did not transform into α alumina at 1200°C, as reported in literature, due to the high intrinsic porosity of aerogel.

A-P 096 PREPARATION AND CHARACTERIZATION OF CATALYSTS Pt/ZEOLITE L BY XRF, XRD AND DTA/TGA

M. D. Oliveira, O. M. S. Ribeiro, S. M. S. Ribeiro, S. B. Cabral, M. G. F. Rodrigues - UFCG, Avenida Aprígio Veloso, 882, Bodocongó, Campina Grande, Paraíba, Brazil

The L zeolite has one-dimensional pores of about 0.71nm aperture leading to cavities of about 0.48x1.24x1.07 nm and its Si/Al ratio is typically 3.0. Some investigations have studied on the properties of L-type zeolite with regards to its structure, properties adsorptive and catalytic. The metal supported in catalysts generally is prepared by impregnation or ion exchange on a support of great superficial area as the silica or alumina. Consequently, this research objectived to prepare and characterize catalysts of the type Pt/L zeolite. The samples were prepared by the method of competitive ion exchange and after were calcined. For characterization of the samples were used the techniques of X-Ray Fluorescence (XRF), X-Ray Diffraction (XRD) and Differential Thermal Analysis and Thermogravimetric Analysis (DTA/TGA).

A-P 097 NICKEL NANOCLUSTER FORMED BY PLASMA ANNEALING FOR CARBON NANOTUBES DEPOSITION

E. F. Antunes, E. J. Corat, A. F. Beloto, V. J. Trava-Airoldi - INPE, Av. dos Astronautas, 1758 - São José dos Campos/SP - CEP 12.245-970; A. O. Lobo -UNIVAP

In this work, we have synthesized dense films of carbon nanotubes by microwave plasma in H₂/N₂/CH₄ environments, on silicon substrates covered by a nickel thin as catalyst. The deposition of nanotubes was carried out in two steps: Step 1 (nanoclusters formation): previously to the deposition of carbon nanotubes, a nickel thin film, deposited by electron beam evaporator, were broken into nanoclusters by microwave plasma bombardment in N₂/H₂ atmosphere. Step 2 (synthesis): the synthesis of nanotubes was performed by adding CH₄, in a temperature of 750 °C. Some parameters, such as time of nanocluster formation and thick of catalytic film, were changed to study the dependence of carbon nanotubes morphology related to size of nanoclusters. The obtained samples were analysed by scanning electron microscopy (SEM) and by Raman Spectroscopy.

A-P 098 MORPHOLOGICAL STUDY OF Co THIN FILMS ON THE CoO/Co/CoSi₂/Si(111) SYSTEM

F. Stavale, C. A. Achete - COPPE/UFRJ, Cid. Universitária-Centro de Tecnologia-Bloco F, sala F-209, Ilha do Fundão - Caixa Postal 68505, Rio de Janeiro, RJ - CEP 21941-972 - BRASIL

This system is interesting for the industry of magneto-electronics because the good growth properties and the GMR effect. Films of CoO /Co / Co_xSi_y / Si(111) with 10 to 50 nm was growth by MBE technique at room temperature (base pressure better than 2 x 10⁻⁹ Torr). The presence of contaminants and the growth mode was performed by AES. EELS and ex-situ XPS measurements determined the silicate. Morphological study was performed using ex-situ AFM.

A-P 099 SYNTHESIS AND CHARACTERIZATION OF LiFePO₄ PREPARED BY SOL-GEL TECHNIQUE

M.A.E. Sánchez, G.E.S. Brito, G. F. Goya, M.C.A. Fantini - IFUSP, Depto. de Física Aplicada, Instituto de Física, Universidade de São Paulo, Caixa Postal 66318, 05315-970, São Paulo, SP, Brasil

The LiFePO₄ is a natural compound, but can also be prepared by synthetic methods. The interest to investigate this compound is due to its electrochemical properties, since it can be used as battery's cathode in its bulk form. The possibility to deposit it as thin film, opens up its use for microbattery technology. The material was prepared by a new sol-gel process for future casting using dip-coating. An alcoholic colloidal suspension was obtained by a sequence of systematic chemical reactions. In order to study the particles in suspension, Small Angle X-ray Scattering (SAXS) was utilized. The SAXS curves can be associated to a system with a very broad particle size distribution or a polymeric type of bonding. Transmission Electron Microscopy (TEM) analysis was performed in order to model the SAXS data. Differential Scanning Calorimetry (DSC) and Thermal Gravimetric Analysis (TGA) of the powder samples (colloidal suspension dried at 70°C) were registered between 25°C and 600°C to study the mass loss and phase transitions, respectively. The dried colloidal suspension is amorphous. After heated at 600°C under a N₂ atmosphere and characterized by X-ray Diffraction (XRD), the material crystallizes and the unit cell parameters were determined, as well as the grain size. Mössbauer spectroscopy and XRD were performed during the whole process of synthesis to analyze the Fe oxidation state and to control the formation of spurious phases.

- A-P 100 Mn-SITE STRUCTURE DETERMINATION IN MANGANESE OXIDES WITH CATALYTIC PROPERTIES
S. J. A. Figueroa, E. J. Lede, F. G. Requejo, M. A. Peluso, J. E. Sambeth - UNLP, calle 49 y 115, La Plata, Argentina, c.c. 67 1900.

The manganese oxides were used in some environmental catalysis reactions for the selective reduction of NO_x, oxidation of CO and volatile organic compounds (VOC's) and elimination of organoclorates. Previous studies have shown that the catalytic activity is closely related with the electronic properties. In this work we analyze the number of Mn-sites and their electronic structure and morphology for different synthesized manganese oxides in order to characterize the Mn-species with best activity. The characterization has been performed by different methods: XRD, EXAFS, XAFS and XPS. XRD results reveal that the powders are nanocrystalline at the same time as EXAFS data show the nature of the Mn-local-simmetry. By XANES analysis we quantitatively determined the mean oxidation state value of Mn in different samples (between +3 and +4) in parallel with XPS studies. Principal Component Analysis (PCA) of XANES spectra revealed that Mn is present in three different octahedral environments, two of them in coincidence with those ones in the Nsutite structure. Based on our experimental evidences we propose a new octahedral one of Mn⁺³, which should be the principal responsible for the catalytic properties.

- A-P 101 DEPOSITION OF POLYCRYSTALLINE SI(1-X)GE(X) ALLOY USING VERTICAL LPCVD SYSTEM
R. C. Teixeira, I. Doi, J. A. Diniz, J. W. Swart, M. B. P. Zakia - UNICAMP, R. Pandiá Calógeras, 90. Cidade Universitária 13083-870 Campinas, SP

SiGe alloy has become a major material for electronic devices, as part of BiCMOS, CMOS and Optoelectronic systems. The deposition low thermal budget makes SiGe also suitable for MEMS applications. In this paper authors report analysis of polycrystalline SiGe thin films by means of Elipsometry (thickness, uniformity, deposition rate), micro-Raman Spectroscopy (Ge contents (x)), AFM (roughness) and XRD measurements (grain size and crystalline orientation). The samples were deposited in a pancake vertical LPCVD system using Silane and Germane as precursor gases in a Hydrogen carrier flow. We found that the obtained films are very uniform (<1%) and Ge fraction (x) varies up to 30% with rms roughness as low as 6 nm.

- A-P 102 OPTIMIZING PORE DIAMETERS IN Al₂O₃ ANODIC FILMS USING FACTORIAL DESIGN
M. L. Cardoso, C. S. Pagani, P. C. Colpa, A. J. A. de Oliveira, E. C. Pereira - UFSCar, Grupo de Supercondutividade e Magnetismo, Rod Washington Luis, km 235, São Carlos, São Paulo, Brazil, 13566-905

It is present the optimization of pore diameter in aluminum oxide prepared under galvanostatic conditions were investigated using factorial design. Three variables were investigated: temperature, current density and H₃PO₄ concentration. The electrochemical parameters of the growth curves were analyzed using the same procedure. The results show that the temperature and current density are the main effects and that all the cross effects are also significant. For the pore diameters, the results shown that this parameter increased 121.50 nm (± 21.63 nm) as the temperature is increased from 15 °C to 25 °C.

- A-P 103 CHARACTERIZATION OF SnTe EPITAXIAL LAYERS GROWN BY MBE
U. A. Mengui, E. Abramof, P. H. O. Rappl, A. Y. Ueta - INPE, LAS, Av. dos Astronautas 1758, 12227-010, São José dos Campos, SP, Brasil

SnTe is a IV-VI narrow gap semiconductor that crystallizes in the rock salt structure. In this work we will present some results obtained in the study of SnTe epitaxial films grown by molecular beam epitaxy on freshly cleaved BaF₂(111) substrates. Prior the growth, the substrates were preheated at 200 °C during 30 min, in the preparation chamber, and at 500 °C during 15 min, in the main chamber. The substrate holder was kept rotating during the growth to insure a reasonable thickness homogeneity for all samples. The Volmer-Weber growth mode was observed by RHEED patterns for all samples. Ex-situ characterization methods were performed mainly by using three different equipments. Firstly, high resolution X-ray diffraction measurements were carried out in a Philips X'Pert diffractometer in omega and omega/2theta. direction, using the open detector mode and triple axis configuration, respectively, for scans in [222] Bragg reflexes. Measured values of FWHM varied from 123 to 223 arcsec whereas the lattice parameters were of about 6.330 angstroms. From AFM images it could be seen that the surface of the samples are very smooth and the appearance of threading dislocations. Electrical measurements carried out at temperatures of 300 and 77K indicated that the epilayers present a p-type carrier concentration of about 10²⁰ cm⁻³, a low resistivity in the order of 10⁻⁴ Ohm.cm, and mobilities varying from 500 to 1600 cm²/Vs.

- A-P 104 HIGH-RESOLUTION X-RAY DIFFRACTION AND GRAZING INCIDENCE X-RAY REFLECTIVITY ANALYSES OF NANOSTRUCTURED POROUS SILICON
P.G. Abramof - CDT, Centro de Desenvolvimento de Tecnologia e Recursos Humanos - CDT, CEP 12242-800 SJC, SP, Brazil; A.F. Beloto, U.A. Mengui, A.Y. Ueta, N.G. Ferreira - INPE

A series of porous silicon (PS) samples were produced by stain etching, using a solution of HF/HNO₃ in a ratio of 500:1 with etching time varying from 1 to 10 min, on p-type (001) silicon wafers with a resistivity of 0.01 to 0.02 ohms.cm. Different x-ray techniques in a high-resolution diffractometer were used to characterize the structure of the samples. Grazing incidence x-ray reflectivity was used to determine the porosity, which was found varying between 35 and 55%. Rocking curves were measured around the (004) Si Bragg peak. The spectra exhibited an intense and narrow peak corresponding to the bulk Si, and, at smaller angles, a less intense and broader diffraction peak related to the porous silicon. This result indicates that the crystallites which compose the PS layers are under in-plane compressive strain. In order to get a better insight into the PS structure, omega/2theta scans were measured with the diffractometer in the triple-axis configuration. These spectra revealed two distributions of the perpendicular component of the lattice parameter that can be associated with the competitive process of the PS layer formation, which leads to two preferential crystallite size distributions. The results show that the variation in the porosity and in the compressive stress is directly correlated with the crystallite size distribution in the PS layers as a function of etching time.

A-P 105 A NEW ROUTE SYNTHESIS OF CdS NANOPARTICLES. SIZE CONTROL IN A COACERVATE MATRIX

H. S. Barud, M. A. U. Martines, F. A. Filho, S. J. L. Ribeiro, Y. Messaddeq - UNESP, Instituto de Química de Araraquara, Caixa Postal 355, CEP 14801-970, Araraquara, SP, Brasil

Nano-composite materials have been largely studied in the last decade due to of the size-dependente quantum confinement the possible application of these new materials to an opto-electronic device. Generally, the necessity to control size, size distributions and compositions of microcrystals have led to attempts to use the sophisticated pocessing techniques. This work presents a simple route for preparing CdS nanosized with narrow size distribution by using coacervation process. The coacervate is a colloidal molecule obtained from phase separation by mixture of polyelectrolitic solutions. The coacervate was prepared by controlled addition of calcium chloride to a sodium polyphosphate (Gram Salt) solution, afterwards it was doped with CdS in different molar ratios. The europium ion was added for structural investigation. This system was studied by photoluminescence, visible-ultraviolet absortion and infra-red spectroscopies, and transmission electron microscopy. The polyphosphate chain of coacervate is able to stabilize and adjust the CdS nanoparticles size distribution.

A-P 106 MOLECULAR DIFFERENTIATION OF LEISHMANIA AMAZONENSIS PROTOZOARIUM USING CdS NANOPARTICLES AS BIOLABELS

B. S. Santos, P. M. A. de Farias, F. D. de Menezes, E. L. Mariano, R. de C. Ferreira UFPE, Depto. Ciências Farmacêuticas - UFPE Cid. Universitária, Recife, PE, 50740-601; S. Giorgio, M. Cegatti, D. Copi, P. M. Lima, C. L. César - UNICAMP

In this work we apply CdS nanoparticles as fluorescent biolabels of Leishmania amazonensis protozoarium. The nanocrystals (9 nm) are obtained via colloidal synthesis in aqueous medium, with final pH=7 using sodium poliphosphate as the stabilizing agent. The surface of the particles is passivated with a cadmium hydroxide shell improving its luminescence properties. In a second step the particle surface is functionalized with glutaric aldehyde, in order to promote the attachment of the nanoparticles to proteins present in the Leishmania surface by Schiff base reactions. The nanoparticles are conjugated to the Leishmania organisms in the promastigote form by incubating CdS nanoparticles at 37oC for 18h. This new fluorescent label showed a high stability against photobleaching and a low toxicity for the live systems. The confocal images of the luminescent Leishmania organisms exhibit a differentiation of the emission color depending on the cellular region of attachment: red emission on the protozoarium surface and at the cytoplasm while green emission on the nucleus and kynetoplast regions. We suggest that this differentiation is due to the distinct energy transfer processes occurring between the CdS nanoparticles and the biomolecules to which they are directly attached in the promastigote organism. These findings support the use of these nanocrystals as versatile probes of cellular processes in living cells.

A-P 107

A NOVEL ONE-STEP CHEMICAL METHOD FOR PREPARATION OF METAL OXIDES MESOPOROUS MACROSPHERES FOR CATALYTIC APPLICATIONS

H. V. Fajardo, R. M. de Almeida, D. Z. Mezalira, L. K. Noda, L. F. D. Probst, A. O. Martins - UFSC, Laboratório de Catálise Heterogênea, Departamento de Química-UFSC, Campus Universitário Trindade, CP 476, 88040-900 Florianópolis-SC Brasil; N. L. V. Carreño – UFS; A. Valentini - UFCE

A new and simple method based on a single step to prepare Al₂O₃ and Fe-Al₂O₃ microspheres containing mesoporous is described. This material has a high surface area (~480m²/g) and a large pore volume ranging from about 0,354 to 0,651 cm³/g. The present method was developed using a biopolymer (chitosan) and Al solution. For the Al₂O₃ microspheres preparation an Al-Chitosan solution was added to NH₄OH solution in form of drops. For the Fe doped Al₂O₃ an Al/Fe-Chitosan solution with different Fe concentration values was added to NH₄OH solution. A hybrid microsphere compound of Al and Al/Fe hydroxide and organic polymer is formed. Through the polymer elimination by thermal treatment, a porous Al₂O₃ with high surface area is obtained. The samples were characterised by means of specific surface area (BET), porous size distribution (BJH), X-ray diffraction (DRX), X-ray photoelectron spectroscopy (XPS), thermogravimetric analyses (TGA), flame atomic absorption spectrophotometry, transmission electron microscopy (TEM). The high surface area and the porosity presented by the microspheres are known to be important properties of materials with catalytic applications. The pore diameter exerts a strong influence in heterogeneous catalysis, acting on the conversion of reactants and on the product's selectivity. In addition, spheroidal catalyst has the advantage of allowing uniform packing on the catalyst bed.

A-P 108

CLEAN SINGLE-WALL CARBON NANOTUBES FOR ELECTRONIC DEVICES

R. G. Lacerda - UFMG, Departamento de Física, Laboratorio de Crescimento de Cristais, Campus da Pampulha, Av. Antonio Carlos, 6627, CP 702, 30123-970, Belo Horizonte, MG; K. B. K. Teo, G. A. J. Amaratunga, W. I. Milne - Cambridge University

The remarkable electronic and mechanical properties of carbon nanotubes have generated an intense interest in their deposition methods over the past few years. For electronic device applications, a fast and 'clean' growth method for SWCNTs without the presence of amorphous carbon (a-C) is essential. In this work, a novel approach based on high temperature (1000°C) and rapid growth (~5s of acetylene, C₂H₂) is used to achieve high quality SWCNTs without a-C. Using a triple-layer thin film of Al/Fe/Mo (with Fe as a catalyst) on an oxidized Si substrate, the sample is exposed to a single short burst (5s) of acetylene at 1000°C. This produced a high yield of very well graphitised SWCNTs, as confirmed by transmission electron microscopy and Raman spectroscopy. The rapid growth process allows us to achieve a clean, amorphous carbon (a-C) free deposition which is important for SWCNT device fabrication. The absence of a-C is confirmed by Auger Electron Spectroscopy, Raman spectroscopy and electrical measurements. By patterning the thin film catalyst, selective growth of SWNT at pre-defined locations on the Si substrate is achieved enabling the fabrication of top and back gate SWCNT transistors. The top gate transistors were formed by contacting the ends of the SWNT (source-drain), covering the SWNT with gate oxide, then putting gate metal on top. The yield and electrical measurements of these transistors at room and low temperature will be discussed.

- A-P 109 **STUDY OF IRON SILICIDES THIN FILMS GROWN BY RDE AND SPE**
D. R. Miquita, R. R. Andrade, M.V.B. Moreira, W. N. Rodrigues, R. M. Paniago, A. G. de Oliveira - UFMG, Laboratório de Epitaxia por Feixe Molecular, Departamento de Física - ICEx - UFMG - Av. Antônio Carlos, 6627 - Belo Horizonte, MG - Brazil, CP 702 - CEP 30123-970

This work deals with the production and investigation of thin films of iron silicides obtained by two different methods: the deposition of iron on silicon crystal surfaces at room temperature followed by the solid state reaction induced by heating (Solid Phase Epitaxy – SPE) and deposition of iron in the hot substrates (Reactive Deposition Epitaxy – RDE). The aim was find the best conditions to obtain the semiconducting phase Beta-FeSi₂. The films were produced under different annealing conditions and analyzed in-situ and ex-situ by X-ray Photoelectron Spectroscopy (XPS), and ex-situ by Conversion Electron Mössbauer Spectroscopy (CEMS). Films of the epsilon-FeSi and Beta-FeSi₂ phases were obtained as well the mixtures Fe₃Si + Beta-FeSi and Epsilon-FeSi + Beta-FeSi₂. It was found that Beta-FeSi₂ forms by conversion of the Epsilon-FeSi layer. The phase transformation occurs due the migration of silicon atoms from the substrate to the surface region driven by the annealing conditions. The best thermodynamic conditions for the phase transformation were met between 700 Celsius and 800 Celsius for SPE, and between 600 Celsius and 700 Celsius for the RDE samples. The most probably the diffusion of silicon through the silicide in case of RDE contrasted to the migration through iron in case of SPE, explains the different best temperature ranges.

- A-P 110 **FABRICATION AND CHARACTERIZATION OF SILICON NANOSTRUCTURES WITH A CORE GERMANIUM BY LOW-PRESSURE CHEMICAL VAPOUR DEPOSITION (LPCVD)**
S. N. M. Mestanza, E. S. V. P. Marins, G. O. Dias, J. E. C. Queiroz, I. Doi, J. W. Swart, L. R. Tesler, H. Martinho, D. C. B. Tejero, R. C. Teixeira - UNICAMP, CCS, Rua: Calogeras 90, Campinas, S.P., Brasil, CP6165, 13083-970

The self-assembling formation of nanostructures has received particular interest because of the feasibility to obtain well defined nanostructures with a high area density beyond limitations in lithography and dry etching techniques. In this work, we have studied further the formation of silicon nanostructure with a Ge core by alternately controlling the selective growth conditions in LPCVD using SiH₄ and GeH₄, both diluted in H₂. The Si substrates was oxidized at 1000°C by 2 min. in an O₂ ambient, for the formation of ~7nm SiO₂ layer. A pre-nucleation of Si was made through a thermal decomposition of SiH₄ at 5 Torr pressure by 30 seconds. Subsequently Ge was deposited at a pressure of 5 Torr, using diluted GeH₄, following a new deposition of Si through SiH₄ at the same anterior conditions. At the Ge deposition we have used the following parameters: 400 and 500°C temperature; 2 and 4 minutes; 20 and 40 sccm GeH₄ + 4800 sccm H₂ dilution. The samples were submitted to RTP thermal treatment for 40 seconds at 700, 800, 900 and 1000 °C, in ambient of forming gas. In this work, conventional photoluminescence (PL) spectrum were obtained at room temperature, showing a broad luminescence in the wavelength range 500-1100 nm for all the samples. We have studied the behavior of PL emission peak and full width at half maximum with the annealing time. Raman-scattering spectrum indicates that compositional mixing occurs partly at the Si/Ge-core interface during LPCVD.

A-P 111 THE INFLUENCE OF THE PHOSPHORUS-DOPED IN SILICON NANOSTRUCTURE FABRICATED BY ION IMPLANTATION

S. N. M. Mestanza, J. E. C. Queiroz, G. O. Dias, E. S. V. P. Marins, I. Doi, J. W. Swart, E. Rodriguez, H. Martinho, A. L. Gazoto - UNICAMP, CCS, Rua: Calogeras 90, Campinas, S.P. Brasil, C.P. 6165

The influence of phosphorus ion doping on the optical characteristics of photoluminescence and raman scattering of the system of nanostructures of silicon in SiO₂ matrix both without annealing and after annealing is analyzed. Silicon dioxide layers with a thickness of 300 nm were grown on a (100) p-substrate of Si, where the silicon implanted was with a dose of 5x10¹⁶ cm⁻² and subsequently annealed at high temperatures. The nanostructures were formed at three temperatures (1000°C, 1100°C and 1200°C) during three hrs. Conventional photoluminescence (PL) spectrums were obtained at room temperature, showing a broad luminescence band in the red region for all the samples. The intensity of photoluminescence of the samples with P implantation, strongly depends on the annealing regime and can either enhance or weaken the PL intensity.

A-P 112 INFLUENCE OF N₂, H₂ AND FORMING GAS ON SPECTROSCOPIC PROPERTIES OF SILICON NANOSTRUCTURE

S. N. M. Mestanza, G. O. Dias, J. E. C. Queiroz, E. S. V. P. Marins, I. Doi, J. W. Swart, E. Rodriguez, H. Martinho, A. L. Gazoto - UNICAMP, Rua: Calogeras 90, Campinas, S.P., Brasil, C.P. 6165

The passivation of silicon nanostructure is of great interest for the optoelectronics, since permits us eliminate the influence of undesirable emitter centers on emission, such as dangling bonds, interface levels and so on. In this work we have prepared samples containing silicon nanostructures obtained by Si implantation into SiO₂, at a dose of 5x10¹⁶cm⁻², ~100Kev energy and annealed in ambient of N₂, at 1100°C over three hours, for the formation of nanostructures. After such formation process we have investigated the influence of some gases in passivation of our samples. We have used three gases for this investigation: H₂, N₂ and forming gas (this latter, being a mixture of hydrogen and nitrogen), all used in an ambient at 450°C. In order to perform our evaluation we utilize some spectroscopic techniques, such as photoluminescence, Raman spectrum and FTIR. By these techniques we have evaluated the light emission efficiency and structure of the silicon nanostructure and composition of our samples.

A-P 113 SYNTHESIS AND CHARACTERIZATION OF CERIUM-INCORPORATED MCM-41 MATERIALS

J. R. Matos, N. A. Oliveira - IQUSP, Av. Prof. Lineu Prestes, 748, São Paulo, SP, Brazil, CEP 05508-000; L. P. Mercuri - CETEC-UNICSUL; M. C. A. Fantini - IFUSP; M. Jaroniec - KSU, OHIO, USA,

The ordered mesoporous molecular sieves such as MCM-41 have attracted considerable interest in several areas. The mesoporous structure of these materials can be controlled by a judicious choice of templates (surfactants), addition of suitable auxiliary organics and selection of proper synthesis conditions (e.g. temperature, time, mixture composition, pH). In addition, their structural ordering and hydrothermal stability can be altered by incorporation of heteroatoms. However, the possibility of doping ordered mesoporous silicas with lanthanides attracted relatively little attention. The aim of this work was to study the synthesis and characterization of MCM-41 materials incorporated with cerium (1, 3 and 5%). The materials were synthesized hydrothermally using a surfactant templating route and characterized by TG/DTG, DSC, FTIR, nitrogen adsorption isotherm and SAXRD. TG/DTG data indicated that the content of surfactant (approximated by the weight loss from about 373 to 623 K) in as-synthesized materials was dependent of cerium content. The materials obtained with lower Ce content (1%) in the synthesis gel exhibited 2-dimensional hexagonally ordered structure of the MCM-41 type. Pore size distributions (PSDs) for Ce doped silicas were narrower than PSD of the pure-silica MCM-41 material synthesized under the same conditions. A decrease in the specific surface area and primary mesopore volume was observed for higher Ce loadings.

A-P 114 CERAMIC SUPPORT FOR SYNTHESIS OF CARBON NANOTUBES BY CATALYTIC CHEMICAL VAPOR DEPOSITION

M. D. Lima, R. Bonadiman, M. J. de Andrade, C. P. Bergmann - UFRGS, Laboratório de Materiais Cerâmicos, Av. Osvaldo Aranha 99, sala 705-c, Centro, Porto Alegre, CEP 90035-190

Carbon nanotubes are a new class of materials discovered in 1991 by S.Iijima that present extraordinary mechanical, electrical and thermal properties. The technique of Catalytic Chemical Vapour Deposition (CCVD) present the highest potential for industrial production of nanotubes. Several support for catalysts as SiO₂ mesoporous, Al₂O₃ and zeolites have been reported. Magnesium oxide (MgO) is a good candidate for this function due to its thermal stability and facility of dissolution in acids, which contributes to the purification of the synthesized nanotubes. Chromium oxide (Cr₂O₃) have the advantage of solubilize Fe₂O₃ generating a solid solution and dispersing iron uniformly over its surface. In the present work, magnesium oxide and chromium oxide were used as supports for catalysts for the synthesis of nanotubes by the CCVD technique. The aim of this work was to compare the performance of the systems support-catalyst employing different atmospheres and temperatures in the synthesis. The catalyst employed was iron oxide, which was dispersed in magnesium oxide (with additions of Mo) through the technique of impregnation and in chromium oxide through the technique of solution-combustion. Natural gas (NG) was employed as carbon source in the contrary of usual methane. The Fe/Cr₂O₃ system presented a great efficiency in the synthesis of NTC in Ar/CH₄ atmospheres and the system Fe/Mo/MgO presented the best production of NTC in H₂/CH₄ atmospheres.

A-P 115 SIMULATION AND FABRICATION OF SILICON MICROTIPS USING ANISOTROPIC REACTIVE ION ETCHING

J.F. Mologni, M.A.R. Alves, E.S. Braga - UNICAMP, DEMIC-FEEC- LABORATORIO DE PLASMA

Anisotropic Reactive Ion Etching of silicon on a RF parallel plate system using SF₆/O₂ plasmas applied for pyramidal silicon microtips fabrication has been studied. Etching behavior was employed to sharpen microtips without any thermal oxidation or wet etching technique. Etch rate and anisotropy have been examined as a function of SF₆ and O₂ flows. Silicon microtips with different aspect ratios were successfully obtained by varying the gas mixtures into the chamber. The finite-element software ANSYS was used to perform the simulations of the fabricated device. The results indicated a higher field enhancement factor compared to an isotropic structure.

A-P 116 THE EFFECT OF SILVER AMOUNT ON THE AVERAGE SIZE OF Y₂O₃:Eu³⁺ NANOPARTICLES

J. L. Ferrari, M. R. Davolos - Instituto de Química - Laboratório de Materiais Luminescentes - Departamento de Química Geral e Inorgânica - Araraquara - Brazil - Rua Professor Francisco Degni s/n; A. M. Pires - FFCLRP - USP; M. A. C. dos Santos - UFS

Nanocrystalline Y₂O₃:Eu³⁺ has deserved much attention due to its potential application in fluorescent lamps, projection TV tubes, as well as basic science research. In this context, we are interested to study the effect of Ag amount on Y₂O₃:Eu³⁺ nanoparticles, searching for the improvement of optical and structural features of these materials. The aim of the present work is to study the influence of silver addition (1, 3, 5 and 7 at. %) in the system Y₂O₃:Eu 5 at. % on particle and crystallite sizes. The nanoparticles were prepared via citrate sol-gel method from the Y, Eu and Ag nitrates, whereas a viscous resin is obtained and heated at 750°C, 4 h. The microcrystallite average size was evaluated by using the Scherrer equation based on the XRD data of the Y₂O₃ [222] reflection plane. The reflection peak widths of the samples with more than 1 at. % of Ag decrease, indicating an increase of the mean microcrystallite size in agreement with the values calculated from the Scherrer equation. From TEM it is also observed an increase of the mean particle size of Y₂O₃:Eu³⁺ 5 at. % from 6.5 to 11.3 nm with the increase of Ag content. In summary, Y₂O₃:Eu³⁺ nanocrystalline particles successfully obtained via citrate sol-gel method present an increase of the mean particle size with the increase of Ag percentage.

- A-P 117 SYNTHESIS AND CHARACTERIZATION OF Al-MCM-41 MESOPOROUS MOLECULAR SIEVE AT ROOM TEMPERATURE
M. A. Logli, L. C. C. Silva, J. R. Matos - IQUSP, Av. Prof. Lineu Prestes, 748, São Paulo, SP, Brazil, CEP 05508-000; M. C. A. Fantini - IFUSP

The discovery of MCM-41 silica opened the way to new zeotype molecular sieves with ordered mesoporous channel systems designated M41S series by Mobil group. These semicrystalline materials can be prepared in a wide range of Si/Al ratio by employing a unique liquid crystal templating mechanism. These materials possess a regular hexagonal array in its mesopore structure with a high surface area, exceptional adsorption capacities and unique catalytic properties. The pore size of MCM-41 can be systematically controlled from 2 to 10 nm by appropriate addition of surfactants, during synthesis. The aim of this work is the synthesis of mesoporous molecular sieve, Al-MCM-41, at room temperature. The synthesis gel was obtained using NH₄OH (mineralizer), CTMABr (surfactant), TEOS (silica source) and Al₂(SO₄)₃ (aluminum source). The material was characterized by small angle X-ray diffraction (SAXRD), N₂ adsorption isotherm, thermal analysis (TG/DTG) and Transmission electron micrographs (TEM). TG/DTG curves show that the surfactant thermal decomposition occurs between 170 and 520°C. SAXRD data shows diffraction peaks characteristic of MCM-41 materials. The adsorption and desorption isotherms of nitrogen of samples show the typical type IV isotherm. A porous structure with a honeycomb like pore arrangement was observed in the TEM image.

- A-P 118 STRUCTURE AND SINTERING OF NiZn FERRITE NANOPOWDERS
A. S. Albuquerque, J. D. Ardisson, W. A. A. Macedo – CDTN, Laboratório de Física Aplicada, Cidade Universitária UFMG, Pampulha, Belo Horizonte, MG, C.P. 941, CEP 30123-970; T. S. Plivelic, I. L. Torriani - LNLS e UNICAMP

The structure of NiZn ferrite (Ni_{0.5}Zn_{0.5}Fe₂O₄) ultrafine powders and the influence of the particle size on the sinterability of this material have been investigated. The ferrite nanopowders were obtained by coprecipitation and heat treatment varying between 300 and 600°C. X-ray diffraction (XRD) was used to follow the structural evolution of the samples and to determine the average particle size (D). Small-angle X-ray scattering (SAXS) experiments were performed in order to obtain additional information on particle size and surface characteristics. The sintering behavior of ceramic bodies obtained from the nanometric powders was investigated by using scanning electron microscopy (SEM) and helium pycnometry. XRD patterns show the evolution of the powders crystallinity with heat treatment. We observed that the average particle size increases with annealing temperature, reaching a maximum value of 31 nm. SAXS results show scattering curves characteristic of smooth particle interfaces. Volume size distribution functions of the scatters have a wide dispersion, centered in values that increase with the heat treatment, indicating the same trend of XRD results. As observed by SEM, sintering at 1250°C for 4h resulted in densification process without appreciable grain growth for sample with D = 22 nm, and remarkable grain growth for D = 16 nm. We show that our ferrite nanopowders present significantly better sinterability than conventional powders.

A-P 119 MAGNETIC NANOSPHERES WITH TARGETED ALKALINE PHOSPHATASE FOR ENZYME PRODRUG THERAPY

A.A.A. de Queiroz, M.R. da Silva, E.D. dos Passos - UNIFEI, Departamento de Física e Química/Instituto de Ciências Exatas, Av. BPS, 1303, CEP: 37.500-903, Itajubá-MG, Brasil.

Techniques based on using magnetisable nanoparticles have found interesting application in hyperthermia. Hyperthermia is a promising approach for the cancer treatment that uses oscillating magnetic fields to heat target areas (cancer tissue) containing magnetic nanoparticles. The possibility of a combined therapy, which would include the release of encapsulated enzymes that will act on the injured cells after hyperthermia treatment, may increase the efficiency of the solid tumor treatment. Poly(2-hydroxy methylmethacrylate) (PHEMA) nanospheres may be a promising carrier for the magnetisable particles and targeted enzymes in cancer therapy. An important part of our laboratory's research is focused on the encapsulation of the $Y_3Fe_5-xAl_xO_{12}$ (YIG) magnetic nanoparticles and cancer therapy based on the delivery of enzymes to tumor sites for use in hyperthermia treatment. PHEMA nanospheres containing $Y_3Fe_5-xAl_xO_{12}$ (YIG) ($0 < x < 2$) and alkaline phosphatase were prepared by suspension polymerization in a batch reactor using radical polymerization. The enzyme delivery to tumors by magnetic nanospheres was used to convert a low toxicity prodrug to a potent cytotoxic agent. To study the biological effects of an alternating magnetic field excited magnetic PHEMA nanospheres, in-vivo studies have been carried out in spontaneously induced tumors in animal models. The results of these studies have shown that magnetic PHEMA nanospheres containing the enzyme were able to reduce the viability of cancer cells.

A-P 120 EXPLORING SYNTHETIC ROUTES TO PREPARE BIOCOMPATIBLE LAYER DOUBLE HYDROXIDES INTERCALATED WITH SPECIES OF PHARMACEUTICAL USE

V.R.L. Constantino, C.A.S. Barbosa, C.R. Gordijo, D.O. Silva - Instituto de Química da USP (IQ-USP), C.P. 26077, CEP 05513-970, São Paulo-SP, Brazil

Layered Double Hydroxides (LDHs) containing Mg and Al ions are good neutralizing agents used as antacids. Recent works have reported the intercalation of biochemical anions such as amino acids and DNA, and also anti-inflammatory and anticonvulsant drugs, between LDHs layers. In this work three synthetic methods were used to intercalate the anti-inflammatory drug ibuprofen into Mg_3Al -LDH: (i) coprecipitation from the metal nitrate solutions; (ii) ion exchange employing the nitrate precursor, (iii) reconstruction from the calcined Mg_3Al -carbonate. According to x-ray diffraction (XRD) patterns of samples obtained by coprecipitation and ion exchange, the observed interlayer spacing (d_{003}) of 28.5 Å can be attributed to a bilayer arrangement of the intercalated ibuprofen molecules with the carboxylate groups interacting with the LDH layers. Sample obtained by reconstruction exhibits XRD profile similar to that of carbonate phase ($d_{003}=7.7$ Å), indicating that ibuprofen is not intercalated but adsorbed on LDHs external surfaces and/or segregated as an amorphous phase. FTIR spectra show that ibuprofen is present in the deprotonated form (maybe grafted). The drug contents (w/w) in samples isolated by ion exchange, coprecipitation and reconstitution are 33, 30 and 13%, respectively, indicating that the guest is balancing 80, 67 and 24% of the layer positive charge. Thermal analysis indicates a slight increase in the thermal stability of ibuprofen when associated to LDH structure.

- A-P 121 NANOSCOPIC MATERIALS AS A NOVEL GLUCOSE OXIDASE MATRIX FOR AMPEROMETRIC BIOSENSORS
A.A.A. de Queiroz, E.G.R. Fernandes - UNIFEI, Av. BPS, 1303, Bairro Pinheirinho, CEP: 37.500-903, Itajubá-MG, Brasil.

Nanostructured ultra thin films containing immobilized enzymes have attracted much attention due to their inherent suitability to biofunctional molecular electronic devices. Dendrimers represent a class of nanoscopic materials with topologically controlled isomolecular macromolecules that mimic the properties of globular proteins and regular micelles. In this work, we report the use of poly(glycerol dendrimers) as a novel matrix for glucose oxidase immobilization in the fabrication of amperometric biosensors. Glucose oxidase (GOD) has been widely used in glucose biosensor design due to its high selectivity to glucose and high activity over a broad range of pH values. In this work, polyglycerol dendrimers were synthesized by ring opening polymerization of glycidol in a step-growth process dominated divergent synthesis. The nucleophilic attack of the epoxy group by alkoxide ions at 230 °C and 50 mmHg in an argon atmosphere was used as a new approach to obtain a dendritic polyglycerol (PGLD) structure. After purification the nature of the PGLD dendritic structure was characterized by GPC and ¹H/¹³C-NMR spectroscopy. The synthesized polyglycerol dendrimer was monodisperse, has a nanometric structure and size-controlled diameter with a large number of hydroxyl groups at its periphery. The hydroxyl groups were activated and GOD was successfully immobilized onto the dendritic macromolecule. The sensor was applied for the determination of glucose concentration in human blood.

- A-P 122 TUNGSTEN OXIDE-SILICA NANOCOMPOSITES PREPARED BY THE SOL-GEL TECHNIQUE FROM PEROXOTUNGSTIC PRECURSORS
C. A. M. Belo, J. M. de Paulo, A. P. Santos CDTN/CNEN, Rua Mário Werneck, s/no., Cidade Universitária, Pampulha, 30123-970

Porous silica monoliths containing tungsten oxide nanoparticles have been prepared by sol-gel technique using tetraethyl orthosilicate (TEOS) and both peroxotungstic acid and its acetic acid derivative as tungsten precursors. SiO₂-WO₃ composites have their main applications as photocatalysts and electrochromic materials. In our group, the research in this area has focused on the development of radiopaque porous materials, which can be utilized as radioactive carrier matrices in iodine-125 interstitial brachytherapy sources. Processing conditions to obtain monolithic glass composites with different pore fractions were achieved. The composites obtained were characterized by nitrogen adsorption, X-ray diffraction, thermal analysis, IR spectroscopy and MEV. The opacity to X-rays was evaluated for samples with different tungsten contents through optical density of radiographic images. The results are discussed with respect to WO₃ concentration, tungsten precursor and heat treatment temperature of the monoliths.

A-P 123

ANALYSIS OF MULTIWALL CARBON NANOTUBES GROWN BY THERMAL CHEMICAL VAPOR DEPOSITION

C. Verissimo, S. A. Moshkalyov, A. C. S. Ramos, J. L. Gonçalves, O. L. Alves, J. W. Swart - UNICAMP, Centro de Componentes Semicondutores, Cidade Universitária Zeferino Vaz, Rua João Pandiá Calógeras, 90, Campinas-SP, Brasil, CEP: 13083-870, Caixa Postal 6061

Carbon nanotubes (CNTs) have received much attention due to their extraordinary thermal, chemical, mechanical, and electrical properties and many potential technological applications. Thermal chemical vapor deposition (CVD) was shown to be an efficient and versatile technique for the synthesis of this interesting nanomaterial. Identification and control of numerous growth parameters is crucial for the development and optimization of the synthesis process, study of growth mechanisms, and nano-devices fabrication. Thus, the study of experimental conditions such as time and temperature of growth, chemical properties of carbon precursor and catalyst, and the gases employed during the growth process is very important. The size of catalyst particles has also been considered an important parameter which also determines characteristics of carbon nanotubes. Here, we present a study involving the use of different transition metals as catalyst initially deposited as thin films supported on SiO₂/Si substrates. These metal films were thermally treated to form separated metal nanoparticles/nanoislands before the thermal CDV process. The growth of MWCNTs using methane-based mixtures was performed. The effect of the main growth parameters such as thickness and composition of the catalyst film, process temperature and duration, and H₂:CH₄ ratio was also evaluated. The sample characterization was performed by scanning electron microscopy and micro Raman spectroscopy.

A-P 124

NANOPARTICLES OF RUTHENIUM, RHODIUM AND PLATINUM IN IONIC LIQUIDS: SYNTHESIS, CHARACTERIZATION AND APPLICATION

G. Machado, C. W. Scheeren, M. A. Gelesky, E. T. Silveira, J. Dupont - UFRGS, Av. Bento Gonçalves, 9500

Ru(0), Rh(0) and Pt(0) nanoparticles can be prepared by controlled decomposition of a organometallic precursors Ru(cod)(cot) and Pt₂(dba)₃ (cod=1,5-cyclooctadiene, cot=1,3,5-cyclooctatriene, dba=bis-dibenzylidene acetone), or reduction of precursors [Rh(cod)Cl]₂ and [Rh(cod)₂]BF₄ dispersed in ionic liquids 1-n-butyl-3-methylimidazolium hexafluorophosphate (BMI.PF₆), tetrafluoroborate (BMI.BF₄) and trifluoromethanesulfonate (BMI.CF₃SO₃), treated with molecular hydrogen (4 atm, 75°C), are a simple and efficient method for the synthesis and stabilization of nanoparticles. XRD analysis of the material indicated that it is constituted of metal (0). TEM shows particles of 2-3 nm in diameter with a narrow size distribution. XPS analysis of Ru(0), Rh(0) shows oxidized, oxygen peaks that indicate the presence of a passivated surface layer. The isolated nanoparticles can be redispersed in the ionic liquid or in solventless conditions for liquid-liquid biphasic or heterogeneous hydrogenation of alkenes and arenes under mild reaction conditions (75°C, 4atm). TEM analysis of the platinum nanoparticles shows evidence of the interaction of the ionic liquid with the particle surface. A selectivity of in cyclohexene can be attained at very low benzene conversion by the use of Ru(0) nanoparticles. The nature of the ionic liquid could be influence in the formation and control of the of Rh(0) nanoparticles growth and, investigate their catalytic behavior in the hidrogenation of benzene.

A-P 125

NANOSTRUCTURED OXIDES OBTAINED BY NITRATES DISSOCIATION

E. A. Brocchi, I. G. Solórzono, D. W. Macedo - PUC - Rio, DCMM, Rua Marques de S. Vicente 225 - Rio de Janeiro

Co-formed oxides have been synthesized and used as starting material in a process route, based on their hydrogen reduction, to obtain some alloys. However, the oxides have also presented some very interesting features which can make them adequate for several important electronic devices. The synthesis procedure is concluded by the nitrates dissociation carried out in a relatively low temperature. Also, previous thermodynamic analysis and experimental studies have clearly shown the feasibility of the process. The experimental samples related to the synthesis were obtained as isolated as well as co-precipitated oxides, such as those of copper and nickel. They were then subjected to high resolution microscopy and the analysis have shown the formation of very small particles. However, even though in a nano scale dimension the particles presented small defects in their inner structure, observed by complementary X-Ray analysis. Amongst them, the metal oxides analysed did not show the same average particle size and a comparison of these aspects is given together with that of the co-formed oxides.

A-P 126

LATERAL TRANSPORT I(V) CHARACTERISTICS ON GaAs/InAs QUANTUM DOT SUPERLATTICES

R. M. Rubinger, L. R. de Souza, C. P. L. Rubinger - UNIFEI, Av. BPS 1303 Itajubá/MG CEP 37500-903; G. M. Ribeiro, H. A. Albuquerque, R.L. da Silva, A. G. de Oliveira, J. C. González, W. N. Rodrigues - UFMG

We have carried on I(V) measurements on GaAs/InAs quantum dot superlattices samples. Due to stress relief, it has been reported that these kind of material are rich in intrinsic defects, some of them are extensive ones including dislocations. Our measurements indicate the contribution of generation and recombination of charge carriers which results in non-linear I(V) characteristics. Under strong electric fields our samples presented negative differential conductivity (NDC) which is an important characteristic for the device industry due to its application as oscillators. Many devices used in telecommunications are examples of application of NDC characteristics such as the Tunnel, IMPATT and Gunn diodes. In this work we have fit I(V) curves with a model of impact ionization and also field-enhanced trapping, for measurements carried under controlled temperature and illumination conditions. We also present impact-ionization threshold-field temperature dependence for measurements carried in darkness and under infrared excitation.

A-P 127 SINGLE WALLED CARBON NANOTUBES FORMED BY CATALYTIC DECOMPOSITION OF METHANE ON Ni/SiO₂

R. M. Almeida, N. S. Gonçalves, L. K. Noda - UFSC, Laboratório de Catálise Heterogênea, Departamento de Química, Campus Universitário Trindade, Florianópolis, CEP 88040-900, Brazil; A. Valentini - UFC

Since their discovery the single-walled carbon nanotubes (SWNTs) have attracted intense interest because of their unique physical, mechanical, and chemical properties. There are several methods for the attainment of the SWNTs, as the electric arc discharge, laser ablation, chemical vapor deposition (CVD). CCVD (catalytic chemical vapor deposition) of hydrocarbons on metals has the ability to grow bulk amounts of carbon nanotubes at relatively low temperatures, but there are usually rich-defect nanotubes (imperfect MWNTs (multi walled carbon nanotubes)). Now there is a growing effort to obtain high quality SWNTs by CVD. It is well known that Raman spectroscopy is one of the most useful techniques for the characterization of carbon nanotubes, specially to distinguish the SWNTs from the MWNTs. In this work the synthesis of carbon nanotubes was carried out by catalytic decomposition of methane, using SiO₂ supported nickel catalyst. The deposited carbon material after the reaction was analysed by Raman spectroscopy and thermogravimetric analysis (TGA). In the Raman spectrum it was observed the evolution of characteristic carbon nanotube bands: the tangential band (1550-1600 cm⁻¹) and the radial breathing mode in the low wavenumber region (130-290 cm⁻¹), the last one typical of the SWNTs. At reaction temperature as low as 650 C the presence of SWNTs was already observed. With higher reaction temperature (700 C) the yield of SWNTs increased remarkably.

A-P 128 IMAGING ELECTROSTATIC AND MAGNETIC FIELDS USING ELECTRON HOLOGRAPHY

M. R. McCartney - Arizona State University, Center for Solid State Science, Arizona State University, Tempe, AZ 85287-1704, USA

Electron holography allows quantitative, high-resolution measurement of magnetic and electrostatic potentials for a wide variety of fascinating and technologically relevant systems. As device parameters continue to decrease into the deep sub-micron range, electron holography can provide a unique imaging tool with its inherent two-dimensional, high-spatial resolution capabilities. Opportunities are available for in-situ modification of electrostatic and magnetic potentials. Application of magnetic fields using small excitations of the objective lens allows imaging of magnetic structure during hysteresis cycles for both thin films and patterned nanostructures. In addition, use of small coils at the level of the objective aperture allows for determination of magnetic response at high frequencies. Examples to be discussed will include imaging of magnetic fields in magnetotactic bacteria and patterned magnetic nanostructures for magnetic random access memory elements. Electrostatic applications will include dopant profiling of source/drain regions in transistors as well as measurement of electrostatic polarization fields in an AlGa_N/InGa_N/AlGa_N heterojunction diode.

A-P 129 SPINODAL DECOMPOSITION, NUCLEATION AND GMR IN $\text{Cu}_{100-x}\text{Co}_x$ (X=5, 10, 15, 20) RIBBONS

M. G. M. Miranda, A. T. da Rosa - CME – UFRGS. Centro de Microscopia Eletrônica - Av. Bento Gonçalves, 9500, 91501-970, Porto Alegre-RS, Brazil, CP 15057; A. B. Antunes - FEEVALE; G. Martinez, M. N. Baibich - IF-UFRGS; E. Estévez-Rams - IMRE.

We have investigated ribbons of the alloy series $\text{Cu}_{100-x}\text{Co}_x$ ($x = 5, 10, 15,$ and 20) using transmission electron microscopy and magneto-transport measurements to correlate nanostructure and Giant Magnetoresistance (GMR). The Cu-Co system shows a large miscibility gap, which has made it a suitable system for the study of many segregation phenomena: nucleation, grain growth and spinodal decomposition. On the other hand, these materials show GMR, which is enhanced with proper heat-treatment. The TEM images for all samples show grains with a clear coarse modulation with wavelengths (?) that increase with x . Measured average values for ? range from about 43 nm for $x=5$ to about 52 nm for $x=20$. Small Co precipitates with a few nm size were observed homogeneously distributed within the grains, whether showing this modulation or not. For $x=15$ and 20 larger non-coherent Co precipitates of up to 100 nm appear uniformly distributed over the whole sample. The modulation observed for all samples can be identified as spinodal decomposition as is expected from the Cu-Co phase diagram. On account of the fast quenching rates for melt spinning, this segregation should have been “frozen-in” during the quench. The presence of the precipitates indicates that nucleation mechanisms are acting in parallel to the segregation processes. The largest GMR appears for $x=10$. This finding was explained in many ways, most of them invoking the size-distribution or the surface-to-volume ratio of the Co granules. As we see very little granules at $x=10$, and also based on our previous work (Phys. Rev. B 68, 014434, 2003), we suggest the explanation for the large GMR should come from the characteristics of the spinodal, as well as from those granules.

A-P 130 PHYSICAL CHARACTERISTICS AND SINTERING BEHAVIOR OF MgO-DOPED ZrO_2 NANOPARTICLES

E. N. S. Muccillo, R. Muccillo, S. K. Tadokoro - IPEN, Centro de Ciência e Tecnologia de Materiais, Caixa Postal 11049, S. Paulo, 05422-970, SP, Brazil

Nanosized particles of 13 mol% MgO-doped ZrO_2 with a narrow distribution of pore sizes were prepared by the coprecipitation technique using optimized parameters of synthesis. Transmission electron microscopy analysis of the calcined powder reveals that the majority of the particles have grain sizes in the 10 to 20 nm range. From nitrogen adsorption analysis an average particle size of 13 nm was estimated, which is similar to the average pore size diameter (12 nm). Besides the unimodal distribution of pore sizes, the linear shrinkage curve of a powder compact exhibits several inflexions indicating different rates of densification up to 1600 °C. After sintering at 1600 °C for 2 h, the microstructure features of a compact are characteristics of the intermediate stage with interconnected porosity preferentially observed at grain boundaries. These results are explained as a size effect of nanoparticles of magnesia-doped zirconia during sintering.

- A-P 131 THE EFFECT OF Si ION IMPLANTATION AND ANNEALING ON THE STRAIN RELAXATION OF PSEUDOMORPHIC Si_{1-x}Ge_x LAYERS ON Si(100)
M.J. Mörschbacher, P.F.P. Fichtner - UFRGS - Instituto de Física-UFRGS, C.P. 15051, 91501-970 Porto Alegre, RS, Brazil; D. Buca, B. Holländer, N. Hueging, M. Luysberg, S. Mantl - Institut für Schicht und Ionentechnik, Forschungszentrum Jülich, D-52425 Jülich, Germany; R. Loo, M. Caymax - IMEC, Kapeldreef 75, B3001, Leuven, Belgium.

Strain relaxed and rather defect-free Si_{1-x}Ge_x/Si(100) heterostructures with a high Ge content are very attractive virtual substrates for the formation of strained Si layers, nowadays a leading material for the fabrication of high speed electronic devices. In this contribution we report experimental results regarding Si implantation induced strain relaxation of pseudomorphic Si_{1-x}Ge_x layers grown by CVD on Si(100). The implantations were performed at room temperature using energies from 55 to 300 keV and doses between 7E13 and 2E14 cm⁻² into SiGe/Si and Si substrates. The SiGe layers were 70 to 160 nm thick with Ge content between 19 and 29 at %. The samples were submitted to rapid thermal annealing at temperatures in the 550-950°C range and times from 30 to 600s and studied by Rutherford backscattering/channeling spectrometry and transmission electron microscopy in plain view and cross-section geometry. The results show that only at specific annealing conditions the excess of Si atoms leads to the formation of extended defects. In a first stage {311} rod like defects are observed. For longer annealing times the {311} defects transform into dislocation loops, which can glide to the SiGe-Si interface and start the relaxation mechanism. Degrees of relaxation up to 75% are measured. The layer quality in terms of dislocation density shows a strong dependence on the Ge content and the implantation dose. These results are discussed in terms of the damage induced by the Si ions.

- A-P 132 ELECTROCATALYTIC OXIDATION OF ETHANOL ON PLATINUM MODIFIED POLYANILINE FILM ELECTRODES
D. A. Fungaro, A. O. Neto, M. Linardi – IPEN, Centro de Química e Meio Ambiente, Av. Prof. Lineu Prestes, 2242, São Paulo, Brazil, Caixa Postal 11049, CEP 05506-000

Conducting polymers with porous structure and high surface area can be used as matrix to incorporate noble metals catalysts for small molecules electro-oxidation applications. Platinum nanoparticles dispersed into polyaniline films have been shown good catalytic performance due to increase of specific area of these materials and higher tolerance to poisoning effect of adsorbed intermediates than bulk platinum electrodes. Electrocatalytic oxidation of ethanol was investigated on platinum modified polyaniline electrodes in sulfuric acid solutions. Ethanol is a non-toxic liquid at ambient conditions and its availability from biomass resources is an important issue for direct ethanol fuel cell applications. The electropolymerization of aniline and the electrochemical depositions of platinum particles into the polyaniline film were achieved by cyclic voltammetry. The electrochemical formation conditions, such as cycle numbers, sweep rates and potentials limits were optimized. It was found that the oxidation of ethanol depends on the nature of both polymer matrix and platinum particles. The optimum catalytic activity for a polyaniline film of 0.08 m thickness was obtained for the following conditions: mPt = 9.5 g cm⁻², sweep rate = 50 mV s⁻¹ and ethanol concentration of 0.50 mol L⁻¹. The platinum-modified polyaniline films formed by these optimization conditions can be used as a convenient conducting substrate for the electro-oxidation of ethanol.

A-P 133

MANGANESE OXIDES NANORODS FROM Na-BIRNESSITE

O. P. Ferreira, L. Otubo, O. L. Alves - UNICAMP-IQ, LQES-Laboratório de Química de Estado Sólido, Cidade Universitária Zeferino Vaz s/n, Campinas, Brazil, P. O. Box 6154, 13081-970

Nowadays much attention has been paid to nanometric systems due to size effects on their chemical and physical properties. Manganese oxides are of considerable importance in many technological applications including catalysis, rechargeable batteries, electrochromic and magnetic materials. Therefore, the preparation of these oxides with nanometric size and different morphologies became a subject of great interest. In this work we report the preparation of manganese oxides nanorods from the hydrothermal treatment of Na-Birnessite. These materials are layered manganese oxides, natural or synthetic, with compositional formula $RyMnO_2 \cdot yH_2O$, $y = 0,7$ where $R = Na^+$ or K^+ . Different conditions of preparation were investigated, such as time, solvent and the use of primary amine. The synthesized products were characterized by SEM, TEM, FTIR, TGA and XRD. Nanorods of MnOOH were obtained through hydrothermal treatment of Na-Birnessite in a dodecylamine aqueous solution, at 170 °C for 1 or 5 days. However, changing the reaction medium to an ethanolic solution of dodecylamine lead to a Mn₃O₄ phase with plate-like morphology. MnOOH nanorods were thermally treated at different temperatures. At 300 and 700 °C, nanorods of MnO₂ and Mn₂O₃ were obtained, respectively. In summary, this work shows the possibility of obtaining nanorods of manganese oxide with several crystalline phases from Birnessite. Therefore, cationic clays obtained from natural resources could be used as precursor material. [CNPq and Millennium Institute of Complex Materials are acknowledged].

A-P 134

SOL-GEL SYNTHESIS AND PROPERTIES OF Co²⁺-DOPED SILICA GLASSES

A. M. M. Santos, V. A. Regis, M. H. O. Teixeira – CDTN, 1Centro de Desenvolvimento da Tecnologia Nuclear, Rua Mario Werneck, s/n, Campus-Pampulha, Belo Horizonte, MG, CP 941, CEP: 30123-970, Brazil; V. C. Costa, W. L. Vasconcelos - EE/UFMG

The present study describes the properties and structure of cobalt-doped silica gel glasses. Silica gels containing 1 mol % cobalt oxide were prepared by hydrolysis of tetraethoxysilane (TEOS) and two different inorganic precursors: cobalt chloride and nitrate. Formamide, N,N-dimethylformamide, ethylene glycol and propylene carbonate were used as additives on the sol-gel solutions preparation. Starting solutions were prepared with H₂O/TEOS molar ratio equal to 3, in acid condition. The dried gels were thermally treated at 400 and 700 °C. The influence of the different drying control chemical additives on the structural evolution of the gels was investigated. The thermal evolution process of the gels were examined by means of DTA, infrared spectroscopy, UV-VIS optical transmission, physical adsorption measurements, and X-ray diffraction technique. The presence of the additives increases the values of the specific area, for the gels heated to 400 °C, to values varying from 400 to 900 m²/g. The thermal evolution of the gels leads to incorporation of Co²⁺ ions in tetrahedral coordination.

A-P 135

CHARACTERIZATION OF THE FE/ZSM-5 CATALYST BY XRD, XRF e DTA/TGA

Y. C. SILVA - Departamento de Engenharia Agrícola; M. L. SILVA, M. G. F. RODRIGUES - Departamento de Engenharia Química, Universidade Federal de Campina Grande Avenida Aprígio Veloso, 882 – Bodocongó – 58.109-970 - Campina Grande – Paraíba.; J.R SOUZA - Centro de Tecnologia do Gás. Avenida Capitão Mor Gouveia, 1480.Lagoa Nova Natal – RN

Zeolites are crystalline aluminum-silicates with three-dimensional structure, containing cavities occupied by cat ions and water molecules with liberty of movement, permitting ionic exchange and reversible dehydration. They are very useful at oil industry, acting like catalysts in a major quantity of separation, petrochemical and refine processes. Particularly the ZSM-5 zeolites have been studied because they present high selectivity to olefins and small deactivation taxes by coke. A modification with iron ions has been applied to develop new catalysts improving the processes performance that use this material as accelerator. Catalysts formed by metals (iron) supported in ZSM-5 zeolites type were prepared. The samples were obtained using the impregnation method followed by calcinations. The solids were characterized by the techniques of X-Ray Diffraction (XRD), R-Ray Fluorescence (XRF), differentiate thermal analysis (DTA) and thermogravimetric analysis (TGA).

A-P 136

ZSM-5 ZEOLITE SYNTHESIS: STRUCTURAL AND TEXTURAL PROPERTIES AFTER NICKEL IONIC EXCHANGE

M. L. SILVA; M. G. F. RODRIGUES, A. C. C. ANDRADE - Departamento de Engenharia Química; Y. C. SILVA - Departamento de Engenharia Agrícola, Universidade Federal de Campina Grande, Avenida Aprígio Veloso, 882 – Bodocongó – 58.109-970 - Campina Grande – Paraíba.; J.R SOUZA - Centro de Tecnologia do Gás. Avenida Capitão Mor Gouveia, 1480.Lagoa Nova Natal – RN

The ZSM-5 zeolite was developed halves of the 70's by Mobil, destined to synthetic gasoline production from methanol, as alternative power source after the oil crisis occurred at that time. Since that the ZSM-5 has been widely applied in catalytic process with organic composts, like fuel or raw material for oil industries. The zeolites can be modified by metal insertion increasing their catalytic potential, without change significantly their structural and textural properties. The objective of this work is to synthesize the ZSM-5 zeolite and change it with nickel, by the ionic exchange process, and this material had been chased because it is one of the most used as catalyst in industrial catalyzed reactions. To confirm the obtainment of the ZSM-5 and the Ni-ZSM-5, were applied the follow characterization techniques: X-Ray Diffraction (XRD), chemical analysis by X-Ray Fluorescence, differentiate thermal analysis (DTA) and thermogravimetric analysis (TGA).