

## Symposium F

### POSTER SESSION PF1 - WEDNESDAY, OCTOBER 11

#### F503 - QUANTITATIVE HRTEM CHARACTERIZATION OF STOICHIOMETRIC AND NANO-STRUCTURED HYDROXYAPATITE

Alexandre Rossi (CBFP), Marcelo Prado da Silva (CBFP), Daniel Biggemann (LNLS) and Antonio Ramirez (LNLS)

A quantitative high resolution transmission electron microscopy (QHRTEM) characterization of stoichiometric hydroxyapatite (HA) and nano-structured HA was performed. Using exit-wave from focal series reconstruction correcting the spherical aberration of the objective lens and thus achieving the information limit of the TEM, together with theoretical HRTEM simulations with multislice method and indexing selected area diffraction (SAD) patterns, the crystal structure is unequivocally determined. Structural differences between stoichiometric HA and nHA are shown.

#### F504 - ELECTRICAL PROPERTIES OF IRON OXIDE-FILLED CARBON NANOTUBES

Lucimara Stolz Roman (UFPR), Aldo J Zarbin (UFPR), Marcela M Oliveira (UFPR), Mariane C Schnitzler (UFPR), Ricardo Possagno (UFPR) and Carlos Eduardo Cava (UFPR)

Carbon nanotubes (CNT) filled with iron oxide alone or in a composite with conductive polymer, deposited in planar geometry between two metallic contacts, presents good properties of charge retention and electrical tests to record, read and erased a bit information show a excellent stability level between the stat on and off. Conductivity tests shows that the best CNT proportion of nanotubes in dispersion in to polymer is between 5% and 10% wt of nanotube and tests into a different atmosphere shows a higher resistance change.

#### F506 - FRACTURE BEHAVIOR OF NITRILE RUBBER - CELLULOSE II NANOCOMPOSITES

Leila Lea Visconte (IMA/UFRJ), João Carlos Miguez Suarez (IME), Vera Lucia Lapa (IMA/UFRJ) and Regina Celia Nunes (IMA/UFRJ)

The reinforcement is normally achieved by adding nanoscaled fillers especially carbon black and silica; addition of organic fillers to rubber produces nanocomposites with adequate properties. In this work was studied the effect of addition of cellulose II (Cel II) on the mechanical behavior of a nitrile rubber (NBR). The nanocomposites were evaluated by tension tests and by scanning electron microscopy (SEM). The tension properties show a gradual change as the Cel II content is increased and the SEM analysis are in agreement with the test results. These data are presented and discussed.

#### F508 - THE NEW ELECTRON MICROSCOPY FACILITY AT THE FEDERAL UNIVERSITY OF MINAS GERAIS (UFMG)

Tânia Mara Dussin (UFMG), Nelcy Della Santina Mohallem (UFMG), Luiz Antônio Cruz Souza (UFMG), Karla Balzuweit (UFMG), Juan Carlos Perez Gonzalez (UFMG), Gregory Kitten (UFMG), Dagoberto Santos Brandão (UFMG), Elizabeth Ribeiro da Silva (UFMG), Virgínia Sampaio Ciminelli (UFMG), Alfredo Gontijo de Oliveira (UFMG), Carlos Alberto Pereira Tavares (UFMG) and José Aurélio Bergmann (UFMG)

The new Microscopy Center at the Federal University of Minas Gerais (UFMG) is presently in the final stages of construction. This new facility, will be fully available to the scientific, state and private enterprise communities in 2007. We envision that this multi-user facility will be a place where researchers from material sciences and biomedical areas will share space, microscopes and knowledge. Such cross-discipline interactions should promote a better interface between these diverse areas and enhance the growth of emerging areas such as nanotechnology and bioengineering.

#### F510 - INVESTIGATION OF THE OPTICAL PROPERTIES OF INFRARED-TO-VISIBLE UPCONVERSION IN ER<sup>3+</sup> DOPED PbO-GeO<sub>2</sub> GLASSES CONTAINING SILVER NANOPARTICLES

Stefan Robert Lüthi (UFPE), Luciana Reyes Pires Kassab (Fatec-SP), Davinson Mariano da Silva (EPUSP), Cid B. Araújo (UFPE) and Anderson S. L. Gomes (UFPE)

Spectroscopic characteristics of Er<sup>3+</sup> doped PbO-GeO<sub>2</sub> (PGO) glasses containing silver nanoparticles (NP) were studied in this work. Absorption spectra of the samples with different annealing times have shown an absorption band around 470nm due to the nanoparticles surface plasmon. The interference of silver nanoparticles in the Er<sup>3+</sup> upconversion process ions was studied under 980nm laser diode pumping. Results of electron transmission microscopy will be presented to characterize the morphology of the silver nanoparticles.

#### F511 - MICRO AND MACRO MECHANICAL ANALYSIS OF THIN FILM FALIURE

Aloisio Nelmo Klein (UFSC), Nabil Abdel Aziz Hussein (UFSC) and Hazim Ali Al-Qureshi (UFSC)

Thin film is applied to the surface of the substrate at room temperature or cured at an elevated temperature. Normally this component is subjected to a certain system of loads which could cause the film to fail by cracking or other type of failure. Therefore, the failure stresses in the film which produced are function of the stresses in the substrate. Now by using Hook's law and the modified theory of Mohr for the failure together with the boundary conditions. A number of failure lines are developed which define the failure space of the film for any biaxial stress state system.

#### F512 - SOFT LITHOGRAPHY IN ORDERED-DESORDERED NANOSTRUCTURES OF TRIBLOCK COPOLYMER

Marcelo Assumpção Pereira-da-Silva (IFSC-USP), Antonio Felix Carvalho (IFSC-USP), Rafael Henriques Longaresi (IFSC-USP) and Roberto Mendonça Faria (IFSC-USP)

In this work, it was used AFM as tool to study formations of organic submicrometric structures under hydrophobic substrates which are

generated by the combination of solvent evaporation and dewetting phenomena of diluted triblock copolymer solution. It was used chloroform, toluene and tetrahydrofuran as organic solvents with respective solubility parameters of  $\gamma = 9,2$ ,  $\gamma = 8,9$  and  $\gamma = 9,1$ . We also varied the concentration of solution which were used to form films on glass and mica substrates. As a final result of this work, a soft lithographic process was developed with the ordered nanostructures.

### **F516 - CHARACTERIZATION OF SOME NATURAL NANOPARTICLES FROM SOILS USING HIGH RESOLUTION TRANSMISSION ELECTRON MICROSCOPY – HRTEM**

Marcos Lima Nobre (UNESP), Angel Fidel Peña (UNESP), George Norman White (TAMU), Mariana Pelissari Baroni (INPE), Joe Boris Dixon (TAMU) and Silvio Rainho Teixeira (UNESP)

X-ray Diffraction, Chemical Analysis (AAS, ICP), Scanning Electron Microscopy (SEM) and High-Resolution Transmission Electron Microscopy (HRTEM) were used to investigate the mineralogy of some soils from Presidente Prudente region, São Paulo State – Brazil. The samples were fractionated (sieve and high speed centrifuge) and concentrated (HGMS and NaOH). Furthermore, a digital image analysis (software IMAGE PRÓ-PLUS) was implemented to improve the structural features interpretation on the HRTEM images. HRTEM analysis of the coarse clay fraction shows aggregates, lattice fringes and particles with lath-shape, curved and rounded one. A great number of grains exhibit lattice fringes.

### **F517 - DEFORMATION BEHAVIOUR OF A NANOSTRUCTURED Al-Fe ALLOY**

Walter J. Botta (Ufscar), C. S. Kiminami (Ufscar), Alberto M. Jorge Jr (Ufscar), J. B. Fogagnolo (Ufscar), Mauricio Mhirdaui Peres (Ufscar) and C. Bolfarini (Ufscar)

Experimental and theoretical analyses indicate a deviation from the Hall-Petch relation for nanostructured materials. We report the deformation behavior of a nanostructured Al-Fe alloy during compression tests. The results indicate that the plastic deformation at low strain rates occurs via the dislocation motion; whereas the dislocation motion alone may not be able to accommodate the imposed strain. Dynamic strain aging, associated with the interactions between the dislocation motion and solute atoms can result in the serrated flow observed during the plastic deformation.

### **F518 - EXFOLIATION BEHAVIOR IN He<sup>+</sup> AND H<sub>2</sub><sup>+</sup> CO-IMPLANTED Si(001) SAMPLES**

Ricardo M. Papaleo (PUC-RS), Francis Rossato (IC-UFRGS), Tatiana L. Marcondes (PGMICRO-UFRGS), Augusto A. D. de Mattos (PGMICRO-UFRGS), Shay Reboh (PGCIMAT-UFRGS), Carlos P. Bergmann (DEMAT-UFRGS) and Paulo F. P. Fichtner (DEMET-UFRGS)

Ion cut process with bonding techniques allow the transfer of single crystalline layers from bulk onto host substrates. The cutting process is usually attributed to the formation of pressurized H<sub>2</sub> filled nanocracks in a specific depth location in the original substrate. Upon subsequent thermal treatments, nanocracks expand. For non bonded substrates, this expansion results on the lift of the Si layer on top of the nanocracks causing localized blistering or exfoliation. In this work we study the ion cut process in Si (001) substrates considering the co-implantation of H<sup>2+</sup> and He<sup>+</sup> ions. We show that the parameters can be optimized to provide 100% of exfoliation. Is

introduced a new mechanism of cut.

### **F519 - MICRO-STRUCTURE OF CO NANO-CLUSTERS PREPARED BY INERT-GAS AGGREGATION**

G. Solorzano (PUC-RIO), Y. T. Xing( Centro Brasileiro de Pesquisas Físicas), F. Vieira (Centro Brasileiro de Pesquisas Físicas), H. Zare-Kolsaraki (Centro Brasileiro de Pesquisas Físicas), and E. Baggio-Saitovitch (Centro Brasileiro de Pesquisas Físicas).

Co nano-clusters were made with an inert-gas aggregation cluster source and the microstructure and size distribution of the Co clusters were studied. The samples were prepared by depositing the Co cluster directly onto a carbon foil sample holder. The high-resolution image of the nano-clusters shows that the Co cluster has a f.c.c. structure and the mean diameter of the clusters is about 4.5 nm. The lower-resolution image shows that the Co clusters have a very narrow size distribution. Both of these two facts are very important for TMR study.

### **F520 - SYNTHESIS BY MPP AND Ti(IV) ISOPROPOXIDE OF ANATASE TiO<sub>2</sub> NANOCRYSTALS UNDER A HYDROTHERMAL CONDITION**

Mario Sergio Galhiane (UNESP), Lucidio souza santos (UNESP), elson longo (UNESP), Cristiano Morita Barrado (UFSCar), Julio Cesar Ossugui (UNESP), Francini Pizzinato kataoka (UNESP) and Fenelon Lima Pontes (UNESP)

Morphology and phase evolution of anatase TiO<sub>2</sub> nanocrystals under a hydrothermal condition in the range of pH 1, 3, 5, 7 and 14 at 200°C for various times was observed. Nanosized TiO<sub>2</sub> with controlled crystal phase and structure were prepared using titanium (IV) iso-propoxide and polymeric precursor method (MPP) as a precursor of TiO<sub>2</sub>. After hydrothermal processing at 200°C for 2h, anatase phase with average crystal size of 5 nm was formed. In addition, concentration small of brookite-type TiO<sub>2</sub> was observed when Titanium (IV) isopropoxide use as precursor. On the other hand, the polymeric precu

### **F521 - TUNNELLING MAGNETORESISTANCE OF CO NANO-CLUSTERS PREPARED BY INERT-GAS AGGREGATION**

Elisa Baggio Saitovitch (Centro Brasileiro de Pesquisas Físicas), Hamid Zare Zare-Kolsaraki (Centro Brasileiro de Pesquisas Físicas), Fillipe Vieira (Centro Brasileiro de Pesquisas Físicas) and Yutao Xing (Centro Brasileiro de Pesquisas Físicas)

Thin Films of Co clusters embedded in solid N<sub>2</sub> were made with an inert-gas aggregation cluster source. The matrix gas N<sub>2</sub> was co-deposited with the Co clusters onto a cold sapphire substrate (p 35 K), which was mounted on a cold-nger of a rotatable <sup>4</sup>He cryostat. Ag contacts for transport measurements were pre-deposited in order to investigate the magnetic transport properties in-situ. The typical dimensions of the sample were 10mmu3mmu50nm. The study shows that at 5 K, the tunnelling magnetoresistance (TMR) is enhanced P25% comparing with the reported highest value in Co granular systems, i.e., Co/CO system. It was reported that in Co/CO system, the interactions between Co and CO can improve the TMR value due to the increasing of spin polarization |P| [1]. In our sample, the spin polarization of the tunnelling electrons was estimated to be |P|<sup>1</sup><sub>4</sub> 0.90(2) using Jullière's model. It is even higher than the |P| in Co/CO system. We believe that the hybridization of 2p-electrons of N<sub>2</sub> and 3d-

electrons of Co increases  $|P|$ , which results in the significant enhancement of TMR. This is an evidence for interaction between Co and N<sub>2</sub> [2].

**F522 - LONG RANGE ROUGHNESS INDUCED BY THE NIFE LAYER DEPOSITION IN NIFE/FEMN EXCHANGE-BIASED SYSTEM**

Priscilla Brandão Silva (IME), Marcos de Castro Carvalho (CBPF), Raul José da Silva Camara mauricio da Fonseca (UERJ), Valéria B. Nunes (PUC-RJ), Armando Biondo (UFES), Edson Caetano Passamani (UFES), Valberto Pedruzzi Nascimento (CBPF), Alex Resende Camara (UERJ) and Elisa Baggio Saitovitch (CBPF)

In this work we have studied how the successive layers deposition may change the roughness properties of the subsequent interfaces at the exchange biased Si/WTi/NiFe/FeMn/WTi multilayer deposited by magnetron sputtering. The X-ray reflectivity and AFM results show that the interfacial root-mean-square roughness values increase after each deposited layer. We suggest that this increasing, due to the successive layer deposition, is caused by a long wavelength component introduced by the NiFe layer deposition. Hurst parameter shows a layer stacking with surfaces more jagged in short range order.

**F523 - ELECTRON MICROSCOPY FACILITY AT LNLS**

Antonio Ramirez (LNLS), Daniel Ugarte (Unicamp/LNLS), Daniel Biggemann (LNLS), Sidnei Ramis de Araujo (LNLS), Paulo Cesar silva (LNLS), Conrado Afonso (LNLS) and Jefferson Bettini (LNLS)

The Electron Microscopy Laboratory attached to the Brazilian Synchrotron Light Laboratory operates as a user facility, where the researchers are trained and operate the microscopes by themselves. Nowadays, the equipment installed at the LME can be briefly described as two Scanning Electron Microscopes and a 300 kV high-resolution transmission electron microscope. The expansion of the LME is on course by the installation of two new TEMs, a 200 kV FEG-STEM/TEM oriented for nano-analysis and electron energy loss spectroscopy and a 200 kV TEM oriented for materials science and in-situ studies.

**F524 - ON THE NUCLEATION OF GAP/GAAS AND THE EFFECT OF BURIED STRESS FIELDS**

Jefferson Bettini (LNLS), José Roberto Bortoleto (Unesp), João Guilherme Zelcovit (Unicamp) and Mônica Alonso Cotta (Unicamp)

We study the growth of GaP/GaAs and the role of a buried InP dot array on GaP nucleation in order to obtain three-dimensional structures. For GaP/GaAs growth, the formation of a two-dimensional layer followed by nucleation of three-dimensional islands was observed. The nucleation of GaP on stressed GaAs, which buried laterally-ordered arrays of InP dots, exhibits lateral ordering compatible with the buried array. The size and shape of GaP dots are strongly affected by the InP stress field. Cross section transmission electron microscopy shows that GaP and InP dots are vertically anti-correlated

**F527 - SYNTHESIS AND CRYSTALLIZATION BEHAVIOR OF TETRAGONAL AND CUBIC LEAD TITANATE USING POLYMERIC PRECURSOR METHOD BY A HYDROTHERMAL ROUTE**

Mario Sergio Galhiane (UNESP), lucidio souza santos (UNESP), Julio

Cesar Ossugui (UNESP), francini Pizzinato Kataoka (UNESP), Debora Lima Pontes (UNESP), Fenelon Lima Pontes (UNESP), Cristiano Barrado Morita (UFSCar) and Elson Longo (UNESP)

Lead titanate (PbTiO<sub>3</sub>) is an eminent ferroelectric material with high Curie temperature, high pyroelectric coefficient, low dielectric constant, and high spontaneous polarization, and therefore it has been employed extensively in electronic and electro-optic devices, such as capacitors, microactuators, ultrasonic transducers and infrared sensors. Although various preparative routes are currently available for the preparation of PT fine powders, such as sol-gel, chemical coprecipitation, emulsion, and hydrothermal technique, only few routes offer reasonable controllability of size, morphology a

**F528 - OPTIMIZATION OF THE HEAT TREATMENT PROFILES USED FOR Nb<sub>3</sub>Sn NANOSTRUCTURED SUPERCONDUCTOR WIRES WITH CU(SN) ARTIFICIAL PINNING CENTERS**

Carlos Alberto Rodrigues (EEL-USP), Lucas Barboza Sarno da Silva (EEL-USP) and Durval Rodrigues Junior (EEL-USP)

The formation of microstructures projected to serve as pinning centers has been presented as one highly promising technique for the optimization of the transport properties in superconductors. However, for the nanometric dimensions of these pinning centers, the profiles of heat treatment must be optimized carefully. The present work describes a methodology for optimization of the heat treatment profiles in respect to diffusion, reaction and formation of the superconducting phases.

**POSTER SESSION PF2 - THURSDAY, OCTOBER 12**

**F530 - MORPHOLOGICAL PROPERTIES AND THERMAL OF NY 66/ORGANOCLAY NANOCOMPOSITES**

Tomás Alves Mélo (UFMG), Edcleide Maria Araújo (UFMG), Taciana R Gouveia (UFMG), Kasselyne Dantas Araújo (UFMG) and Renata Barbosa (UFMG)

Polymer-silicate nanocomposites are materials that presented excellent properties as compared with others polymer traditional. Nanocomposites containing nylon 66 and montmorillonite clay organically modified with quaternary ammonium salts were obtained via direct melt intercalation. After the treatment, the powder was characterized by X-ray diffraction (XRD). The produced nanocomposites were characterized by mechanical properties and HDT. HDT's properties presented very interesting values for

**F535 - MICROSPHERE ORGANIZATION OF CUO NANOSTRUCTURED SYNTHESIZED BY HYDROTHERMAL METHOD**

Edson Roberto Leite (DQ - UFSCar), Cauê Ribeiro (UFOP), Diogo Paschoalini Volanti (IQ - UNESP) and Elson Longo (IQ - UNESP)

CuO nanostructured were synthesized through a controllable solution-phase hydrothermal method using a nonionic surfactant polyethylene glycol (PEG) as the structure-directing template. The morphologies were investigated by FEG and TEM. The size and morphology of the products were measurement by field emission scanning electron microscopy (FE-SEM; Zeiss, Supra 35 at

2kV) and transmission electron microscopy (TEM; Philips CM200, operating at 200 kV). In summary, this simple method may be extended to prepare novel nanostructures of other metal oxides.

#### **F540 - STRUCTURAL INVESTIGATION OF TIN/CNX SUPER LATTICES AND FAILURE MECHANISMS**

Lilian Raquel Moretto (SOCIESC), Mônica de Mesquita Lacerda (UDESC e SOCIESC) and Marcos Antônio Rebello (SOCIESC)

TiN/CNx super lattices deposited by DC Magnetron Sputtering in a dual cathode system have been studied in order to investigate their thermal stability under high temperature conditions. Samples have been investigated by Thermo Gravimetric and Differential Thermal Analysis (TGA and DTA) techniques at a constant temperature rate of 10°C/min up to 800°C in N<sub>2</sub> atmosphere. No crystalline phase change occurred to a specific sample up to 680°C and Electron Scanning Microscopy (SEM) images show damaged and fractured surfaces and indicate distinct failure mechanisms for samples deposited with no bias.

#### **F543 - STUDY OF GROWTH OF TIN OXIDE NANOBELTS BY THERMAL EVAPORATION OF SnO**

Macario, R.L. (UFSCar) ; Orlandi, M.O.b (UNESP); Longo, E.c (UNESP); Leite, E.R. (UFSCar)

In this work the influence of temperature of synthesis on the structural and morphological properties of tin oxide nanobelts was studied. The synthesis was employed by direct thermal evaporation of SnO powder, and the results showed that width of the nanobelts increase by increasing the temperature of synthesis.

#### **F544 - NEON IMPLANTATION IN SILICON AT ELEVATED TEMPERATURES**

Paulo F.P. Fichtner (Depto. Metalurgia - UFRGS), Jean-François Barbot (Université de Poitiers), Marie-France Beaufort (Université de Poitiers), Erwan Oliviero (UFRGS), Livio Amaral (UFRGS), Suzana Peripolli (UFRGS) and Steve E. Donnelly (University Salford)

We study the effects of neon implantation in (001) Silicon considering different target temperatures from 250 to 900°C, followed by high temperature annealing at 900, 1100 and 1250°C. The samples were investigated by transmission electron microscopy (TEM), Rutherford Backscattering Spectroscopy (RBS) and Elastic Recoil Detection (ERD). The obtained Ne bubble systems are analysed using a hard-sphere real gas equation of state in order to explain their properties.

#### **F548 - CHARACTERIZATION OF THERMODYNAMICALLY NON-STABLE TIN OXIDE NANOSTRUCTURES BY ELECTRON MICROSCOPY**

Edson Roberto Leite (UFSCar), Jefferson Bettini (LNLS), Marcelo Ornaghi Orlandi (FEIS-UNESP) and Elson Longo (IQ-UNESP)

In this work we present the synthesis and the morphological and structural characterization of tin oxide nanobelts grown on a novel tin-rich phase. The nanobelts were grown by carbothermal evaporation process and were characterized by X-ray diffraction (XRD), Rietveld refinements, scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM) and

energy dispersive X-ray spectroscopy (EDX). The results showed that belts grown at Sn<sub>4</sub>O<sub>2</sub> stoichiometry, and that the carbothermal reduction method should be a key to stabilize this tin-rich phase.

#### **F549 - STUDIES OF EU<sup>3+</sup> LUMINESCENCE IN TELLURITE GLASSES WITH GOLD NANOSTRUCTURES**

Anderson S. Leonidas Gomes (UFPE-PE), Cid B. de Araújo (UFPE-PE), Davinson Mariano da Silva (EPUSP-SP), Ricardo de Almeida Pinto (Fatec-SP) and Luciana R. Pires Kassab (Fatec-SP)

Spectroscopic properties of Eu<sup>3+</sup> doped Tellurite glasses containing gold nanoparticles are presented. The contribution of gold nanoparticles on Eu<sup>3+</sup> luminescence is investigated and the emission spectra of the samples submitted to different annealing times showed a large enhancement of Eu<sup>3+</sup> emission. Results of transmission microscopy will be presented in order to analyse the size and the shape of the gold nanoparticles.

#### **F551 - GMI EFFECT IN MONOLAYER, MULTILAYER AND SANDWICHED IN AMORPHOUS THIN FILMS**

Rubem Luiz Sommer (CBPF), Marcio Assolin Corrêa (UFSM), Alexandre Da Cas Viegas (UFSC), Felipe Bohn (UFSM) and Antônio Marcos H de Andrade (UFSM)

In this work, the results of GMI in thin films produced by magnetron sputtering in the monolayer, multilayer and sandwich form are presented. The ferromagnetic material studied was the amorphous precursor of nanocrystalline FINEMET with composition Fe<sub>73.5</sub>Cu<sub>1</sub>Nb<sub>3</sub>Si<sub>13.5</sub>B<sub>9</sub>. We performed magnetization measurements with a VSM, besides TEM and Kerr effect in order to analyze magnetic and structural properties. Magnetoimpedance ratios of 280% were observed in to the multilayer sample with probe current frequency of 1.2 GHz.

#### **F553 - CARBON NANOTUBES PREPARED IN MESOPOROUS AAO MEMBRANES BY CCVD**

Celso Valentim Santilli (IQ/UNESP-Araraquara), Sandra Helena Pulcinelli (IQ/UNESP-Araraquara), Peter Hammer (IQ/UNESP-Araraquara) and Roberto Bertholdo (IQ/UNESP-Araraquara)

Carbon nanotubes (CNTs) were synthesized by catalytic chemical vapor deposition method (CCVD), using the channels of anodic aluminum oxide (AAO) as template. The effect of different methods of the iron catalyst particles on the CNT growth and their structural perfection was investigated by scanning electron microscopy (SEM). The SEM results show the high size distribution of catalyst particle and CNTs with diameters around 15 nm and few microns of length.

#### **F555 - NANOSCALE CARBO-NITRIDE PRECIPITATION IN HSLA Nb-Cr-Mo STEEL**

Guillermo Solórzano (PUC-Rio), Adriana de Almeida Halfeld Vieira (PUC-Rio) and Ivani de Souza Bott (PUC-Rio)

Thermo-mechanical controlled processing (TMCP) of high strength low alloy (HSLA) steels are extensively used to produce high-strength pipeline steels for the oil industry. These steels usually have small additions of niobium, titanium and vanadium as microalloying elements. These microalloying elements are such strong carbide forming elements that they are capable

of preferentially forming alloy carbides at alloying concentrations less than 0.1wt% [1].

**F556 - TRANSMISSION ELECTRON MICROSCOPE STUDY OF DOT-IN-A-WELL INAS/INGAAS/INP STRUCTURES**

Sandra Landi (PUC-Rio), Guillermo Solórzano (PUC-Rio), Mauricio Pires (UFRJ) and Patricia Souza (PUC-Rio)

InAs quantum dots (QD) grown on InP substrates are expected to provide applications such as integrated optoelectronic devices for optical fiber communication and room temperature operating infrared photodetectors. In particular, there is interest in developing mid- (3–5  $\mu\text{m}$ ) and long-wavelength (8–12  $\mu\text{m}$ ) infrared photodetectors for applications including night vision, environmental monitoring, toxic gas detection and atmospheric communications.

**F557 - TWO-STEP SINTERING AND DIELECTRIC PROPERTIES OF TRANSLUCENT NANOCRYSTALLINE BaTiO<sub>3</sub> CERAMICS**

Ronaldo Santos da Silva (IFSC-USP) and Antonio Carlos Hernandez (IFSC-USP)

Translucent BaTiO<sub>3</sub> ceramics with an average grain size of 350 nm have been achieved through two-step sintering method. The ceramics also presented an homogeneous microstructure and a high dielectric constant about 3000 at room temperature.

**F563 - STUDY OF THE TOPOGRAPHY OF PARTIALLY STABILIZED ZIRCONIA SUBSTRATE AND ITS INFLUENCE ON THE NUCLEATION OF CVD DIAMOND**

Márcia Maria Lucchese, N. M. Balzaretto and J. A. H. Jornada

The effect of the topography of partially stabilized zirconia (ZrO<sub>2</sub> PE) used as the substrate for deposition of CVD diamond was investigated by AFM and SEM. The results indicated the grain boundaries at the surface substrate play an important role in the diamond nucleation. It was observed that the nucleation density depends on the thermal treatment used in the sintering process of the ZrO<sub>2</sub> PE powder. The dynamics of the CVD process, containing atomic hydrogen, carbon and oxygen species at high temperature, associated to the presence of oxygen vacancies in the ZrO<sub>2</sub> PE structure and to the grain boundary configuration, determines the diffusion mechanisms and chemical reactions at the surface.