

Abstracta

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Trabalhos Publicados

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P001-10 à P056 -10

Trabalhos Publicados

P001-10 "A SAXS and Swelling Study of Cured Natural Rubber/Styrene-Butadiene Rubber Blends"

Salgueiro, W., Somoza, A., Marzocca, A. J., Torriani, I., and Mansilla, M. A.

A small-angle X-ray scattering (SAXS) and swelling study of natural rubber and styrene-butadiene rubber blends (NR/SBR) is presented. To this aim, specimens of NR and SBR and blends with 75/25, 50/50, and 25/75 NR/SBR ratios (in phr) were prepared at a cure temperature of 433 K and the optimum cure time ($t(100)$). This time was obtained from rheometer torque curves. The system of cure used in the samples was sulfur/*n*-butyl-2-benzothiazole sulfenamide. From swelling tests of the cured samples, information about the molecular weight of the network chain between chemical crosslinks was obtained. For all cured compounds, in the Lorentz plots built from SAXS scattering curves, a maximum of the scattering vector q around 0.14 \AA^{-1} was observed. However, the q position shows a linear-like shift toward lower values when the SBR content in the SBR/NR blend increases. In pure NR or SBR the q values show a different tendency. The results obtained are discussed in terms of the existence of different levels of vulcanization for each single phase forming the blend and the existence of a third level of vulcanization located in the interfacial NR/SBR layer. (C) 2009 Wiley Periodicals, Inc. *J Polym Sci Part B: Polym Phys* 47: 2320-2327, 2009

Journal of Polymer Science Part B-Polymer Physics 47[23], 2320-2327. 2009.

P002-10 "Accretion of nonminimally coupled scalar fields into black holes"

Rodrigues, M. G. and Saa, A.

By using a quasistationary approach, we consider the mass evolution of Schwarzschild black holes in the presence of a nonminimally coupled cosmological scalar field. The mass evolution equation is analytically solved for generic coupling, revealing a qualitatively distinct behavior from the minimal coupling case. In particular, for black hole masses smaller than a certain critical value, the accretion of the scalar field can lead to mass decreasing even if no phantom energy is involved. The physical validity of the adopted quasistationary approach and some implications of our result for the evolution of primordial and astrophysical black holes are discussed. More precisely, we argue that black hole observational data could be used to place constraints on the nonminimally coupled energy content of the Universe

Physical Review D 80[10]. 104018. 2009.

P003-10 "Acidity control of ruthenium pillared clay and its application as a catalyst in hydrogenation reactions"

Figueiredo, F. C. A., Jordao, E., Landers, R., and Carvalho, W. A.

Aluminum pillared clay was used as a support for the preparation of catalysts containing ruthenium as active metal, in the presence or not of a promoter (tin) and an acid reducer (barium). The catalysts were characterized and tested for hydrogenation of dimethyl adipate reactions. The results showed a high conversion, typically above 95% in all studied systems. This conversion occurs irrespectively of the presence of active metal; therefore, it may be due to the support's intrinsic activity. The acidity was identified as the main cause of this activity. A barium treatment of these catalysts significantly reduced this acidity, thus making more selective the available systems. The catalysts treated with barium reduced the formation of undesirable products up to 45%. Similarly, the presence of tin helped to obtain valuable products such as gamma-caprolactone and methyl caproate, which reached high selectivity values (18.6% and 16.9%, respectively). (C) 2009 Elsevier B.V. All rights reserved

Applied Catalysis A-General 371[1-2], 131-141. 2009.

P004-10 "Acoustic detection of the magnetocaloric effect: Application to Gd and Gd₅O₉Ge₂O₃Si_{1.88}"

Guimaraes, A. O., Soffner, M. E., Mansanares, A. M., Coelho, A. A., Magnus, A., Carvalho, G., Pires, M. J. M., and Gama, S.

In this paper we present a simple method for the determination of the total magnetocaloric effect based on the acoustic detection of the adiabatic temperature rise caused by the application of an ac magnetic field of small amplitude. The continuous scanning of a superimposed dc magnetic field allows, by numerical integration, the determination of large temperature variations caused by magnetic field steps from zero to tens of kOe. Absolute values of temperature rise are easily acquired after the calibration of the microphone signal using an appropriate reference sample. Once the calibration is done, no further information about the sample's thermal properties is necessary since the measured signal is directly proportional to the temperature variation. Measurements were made in Gd and Gd₅O₉Ge₂O₃Si_{1.88} samples in the temperature range from 240 to 320 K. The technique shows to be suitable for the investigation of materials undergoing both purely magnetic phase transitions, as in the case of Gd, and magnetic-crystallographic first-order ones, as observed for Gd₅O₉Ge₂O₃Si_{1.88}. Besides the ability to determine the temperature variation due to a large magnetic field step through the continuous scanning of the magnetic field, the technique is also very suitable for measuring the magnetocaloric effect under very small magnetic field steps since it has sensitivity below millikelvin. Moreover, it is able to detect temperature variations in very small amount of sample, leading to its potential application in magnetocaloric thin films

Physical Review B 80[13]. 134406.2009.

P005-10 "Anatomical atlas-guided diffuse optical tomography of brain activation"

Custo, A., Boas, D. A., Tsuzuki, D., Dan, I., Mesquita, R., Fischl, B., Grimson, W. E. L., and Wells, W.

We describe a neuroimaging protocol that utilizes an anatomical atlas of the human head to guide diffuse optical tomography of human brain activation. The protocol is demonstrated by imaging the hemodynamic response to median-nerve stimulation in three healthy subjects, and comparing the images obtained using a head atlas with the images obtained using the subject-specific head anatomy. The results indicate that using the head atlas anatomy it is possible to reconstruct the location of the brain activation to the expected gyrus of the brain, in agreement with the results obtained with the subject-specific head anatomy. The benefits of this novel method derive from eliminating the need for subject-specific head anatomy and thus obviating the need for a subject-specific MRI to improve the anatomical interpretation of diffuse optical tomography images of brain activation. (C) 2009 Elsevier Inc. All rights reserved

Neuroimage 49[1], 561-567. 2010.

P006-10 "Azimuthal Charged-Particle Correlations and Possible Local Strong Parity Violation"

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J.,

Parity-odd domains, corresponding to nontrivial topological solutions of the QCD vacuum, might be created during relativistic heavy-ion collisions. These domains are predicted to lead to charge separation of quarks along the system's orbital momentum axis. We investigate a three-particle azimuthal correlator which is a P even observable, but directly sensitive to the charge separation effect. We report measurements of charged hadrons near center-of-mass rapidity with this observable in Au+Au and Cu+Cu collisions at $\sqrt{s_{NN}}=200$ GeV using the STAR detector. A signal consistent with several expectations

from the theory is detected. We discuss possible contributions from other effects that are not related to parity violation

Physical Review Letters 103[25]. 251601.2009.

P007-10 “Center of mass energy and system-size dependence of photon production at forward rapidity at RHIC”

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Badyal, S. K.,

We present the multiplicity and pseudorapidity distributions of photons produced in Au + Au and Cu + Cu collisions at $\sqrt{s_{NN}} = 62.4$ and 200 GeV. The photons are measured in the region $-3.7 < \eta < -2.3$ using the photon Multiplicity detector in the STAR experiment at RHIC. The number of photons produced per average number of participating nucleon pairs increases with the beam energy and is independent of (lie collision centrality. For collisions with similar average numbers of participating nucleons the photon multiplicities are observed to be similar for Au + Au and Cu + Cu collisions at a given beam energy. The ratios of the number of charged particles to photons in the measured pseudorapidity range are found to be 1.4 ± 0.1 and 1.2 ± 0.1 for $\sqrt{s_{NN}} = 62.4$ and 200 GeV, respectively. The energy dependence of this ratio could reflect varying contributions from baryons to charged particles, while mesons are the dominant contributors to photon production in the given kinematic region. The photon pseudorapidity distributions normalized by average number of participating nucleon pairs, when plotted as a function of η -Y-beam, are found to follow a longitudinal scaling independent of centrality and colliding ion species at both beam energies. (C) 2009 Elsevier B.V. All rights reserved

Nuclear Physics A 832[1-2], 134-147. 2010.

P008-10 “Coherent state approach to the cross-collisional effects in the population dynamics of a two-mode Bose-Einstein condensate”

Viscondi, T. F., Furuya, K., and de Oliveira, M. C.

We reanalyze the non-linear population dynamics of a Bose-Einstein condensate (BEC) in a double well trap considering a semi-classical approach based on a time dependent variational principle applied to coherent states associated to SU(2) group. Employing a two-mode local approximation and hard sphere type interaction, we show in the Schwinger's pseudo-spin language the occurrence of a fixed point bifurcation that originates a separatrix of motion on a sphere. This separatrix corresponds to the borderline between two dynamical regimes of Josephson oscillations and mesoscopic self-trapping. We also consider the effects of interaction between particles in different wells, known as cross-collisions. Such terms are usually neglected for traps sufficiently far apart, but recently it has been shown that they contribute to the effective tunneling constant with a factor growing linearly with the particle number. This effect changes considerably the effective tunneling of the system for sufficiently large number of trapped atoms, in perfect accord with experimental data. Finally, we identify analytically the transition parameter associated to the bifurcation in the generalized phase space of the model with cross-collision terms, and show how the dynamical regime depends on the initial conditions of the system and the collisional parameters values. (C) 2009 Elsevier Inc. All rights reserved

Annals of Physics 324[9], 1837-1846. 2009.

P009-10 “Cross sections for electron scattering by carbon disulfide in the low- and intermediate-energy range”

Brescansin, L. M., Iga, I., Machado, L. E., Michelin, S. E., and Lee, M. T.

In this work, we report a theoretical study on e(-)-CS₂ collisions in the low- and intermediate-energy ranges. Elastic differential, integral, and momentum-transfer cross sections, as well as grand total (elastic+inelastic) and absorption cross sections, are reported in the 1-1000 eV range. A recently proposed complex optical potential composed of static, exchange, and correlation-polarization plus absorption contributions is used to describe the electron-molecule interaction. The Schwinger variational iterative method combined

with the distorted-wave approximation is applied to calculate the scattering amplitudes. The comparison between our calculated results and the existing experimental and/or theoretical results is encouraging

Physical Review A 81[1]. 012709. 2010.

P010-10 “Curved graphene nanoribbons: structure and dynamics of carbon nanobelts”

Martins, B. V. C. and Galvao, D. S.

Carbon nanoribbons (CNRs) are graphene (planar) structures with a large aspect ratio. Carbon nanobelts (CNBs) are small graphene nanoribbons rolled up into spiral-like structures, i.e. carbon nanoscrolls (CNSs) with a large aspect ratio. In this work we investigated the energetics and dynamical aspects of CNBs formed from rolling up CNRs. We have carried out molecular dynamics simulations using reactive empirical bond-order potentials. Our results show that, similarly to CNSs, CNB formation is dominated by two major energy contributions, the increase in the elastic energy due to the bending of the initial planar configuration (decreasing structural stability) and the energetic gain due to van der Waals interactions of the overlapping surface of the rolled layers (increasing structural stability). Beyond a critical diameter value these scrolled structures can be even more stable (in terms of energy) than their equivalent planar configurations. In contrast to CNSs that require energy-assisted processes (sonication, chemical reactions, etc) to be formed, CNBs can be spontaneously formed from low temperature driven processes. Long CNBs (length of similar to 30.0 nm) tend to exhibit self-folded racket-like conformations with formation dynamics very similar to the one observed for long carbon nanotubes. Shorter CNBs will be more likely to form perfect scrolled structures. Possible synthetic routes to fabricate CNBs from graphene membranes are also addressed

Nanotechnology 21[7]. 075710. 2010.

P011-10 “Dynamic changes in white and gray matter volume are associated with outcome of surgical treatment in temporal lobe epilepsy”

Yasuda, C. L., Valise, C., Saude, A. V., Pereira, A. R., Pereira, F. R., Costa, A. L. F., Morita, M. E., Betting, L. E., Castellano, G., Guerreiro, C. A. M., Tedeschi, H., de Oliveira, E., and Cendes, F.

Background: The reasons for surgical failure in 30% of patients with unilateral mesial temporal lobe epilepsy (MTLE) are still unclear. We investigated if different outcomes could be associated to different patterns of subtle gray matter atrophy (GMA) and white matter atrophy (WMA), and searched for postoperative magnetic resonance imaging (MRI) changes. Methods: We studied 69 controls and 67 operated patients with refractory unilateral MTLE. Patients were grouped as seizure-free (SF) group (34 patients Engel's IA), worthwhile improvement group (23 patients, Engel's IB-IIA) and failure group (10 patients Engel's IIB-IV). We created a voxel-based morphometry/MATLAB code to mask the surgical lacuna, and performed t-test and paired t-test to evaluate preoperative and postoperative MRI scans. Results: Failure group showed a widespread pattern of preoperative GMA. On SF and improvement groups we identified a more restricted pattern of GMA. The three groups presented a widespread, bilateral pattern of WMA. In contrast, postoperative analyses showed bilateral hemispheric recovery (a relative increase of WM concentration) on SF and improvement groups, but few changes on failure group. We also identified areas with relative postoperative increase of GM on both SF and improvement groups, more widespread on SF group. Conclusion: Areas of subtle GMA may be related to poorer surgical outcome. In addition, we demonstrated a postoperative relative increase of WM and GM concentration associated with seizure control. These changes may represent neuroplasticity related to improvement of brain function after seizure control. Further studies with a multimodal approach may help to predict surgical outcome and improve selection of patients for surgical treatment of MTLE. (c) 2009 Elsevier Inc. All rights reserved

Neuroimage 49[1], 71-79. 2010.

P012-10 “Effect of Relative Humidities on Microstructural, Barrier and Mechanical Properties of Yam Starch-Monoglyceride Films”

Ferreira, F. A. B., Grossmann, M. V. E., Mali, S., Yamashita, F., and Cardoso, L. P.

The effect of monoglyceride on microstructural, barrier and mechanical properties of casted yam starch films were investigated in different relative humidities (RH) and compared with glycerol-starch films. A single screw extruder was used to produce the starch - monoglyceride complex before film production and this process was effective to inhibit the phase separation in films. The addition of the hydrophobic compound reduced hydrophobicity, transparency and water vapor permeability of films. This later value for starch-glycerol film (1.7×10^{-10} g Pa⁻¹ s⁽⁻¹⁾ m⁽⁻¹⁾) was higher than starch (1.2×10^{-10} g Pa⁻¹ s⁽⁻¹⁾ m⁽⁻¹⁾) and monoglyceride-starch films (1.0×10^{-10} g Pa⁻¹ s⁽⁻¹⁾ m⁽⁻¹⁾). Films containing glycerol had higher relative crystallinity (B and V-H) with a slight increase at higher RH values, while for monoglyceride films, the crystallinity was constant. Monoglyceride-starch films presented poor mechanical properties when compared to glycerol-starch ones but they presented a stable behavior under different relative humidities

Brazilian Archives of Biology and Technology 52[6], 1505-1512. 2009.

P013-10 “Electron collisions with the CH₂O-H₂O complex”

Freitas, T. C., Lima, M. A. P., Canuto, S., and Bettega, M. H. F.

We report cross sections for elastic collisions of low-energy electrons with the CH₂O-H₂O complex. We employed the Schwinger multichannel method with pseudopotentials in the static-exchange and in the static-exchange-polarization approximations for energies from 0.1 to 20 eV. We considered four different hydrogen-bonded structures for the complex that were generated by classical Monte Carlo simulations. Our aim is to investigate the effect of the water molecule on the pi* shape resonance of formaldehyde. Previous studies reported a pi* shape resonance for CH₂O at around 1 eV. The resonance positions of the complexes appear at lower energies in all cases due to the mutual polarization between the two molecules. This indicates that the presence of water may favor dissociation by electron impact and may lead to an important effect on strand breaking in wet DNA by electron impact

Physical Review A 80[6]. 052009. 2009.

P014-10 “Experimental study of a methodology for Fission-track Dating without neutron irradiation”

Hadler, J. C., Lunes, P. J., Tello, C. A., Chemale, F., Kawashita, K., Curvo, E. A. C., Santos, F. G. S., Gasparini, T. E., Moreira, P. A. F. P., and Guedes, S.

To carry out the dating by the Fission Track Method (FTM) the international community that works with this method employs methodologies in which the mineral to be dated must be irradiated with neutrons. Such irradiation, performed in a nuclear reactor, demand a relatively long waiting time so that the activity of the sample attain a proper level for handling. The present work aims to establish a methodology that makes possible the dating by FTM using a mass spectrometer instead of a nuclear reactor. This methodology was applied to apatite samples from Durango, Mexico. (C) 2009 Elsevier Ltd. All rights reserved

Radiation Measurements 44[9-10], 955-957. 2009.

P015-10 “Fabrication of Photonic Optical Fibers from Soft Glasses”

Chillcce, E. F., Rodriguez, E., Alves, O. L., Cesar, C. L., Mazali, I. O., and Barbosa, L. C.

The stack-and-draw technique has been used to fabricate photonic crystal fibers (PCFs) from four different types of soft glass, namely, borosilicate, alkaline, lead, and tungsten-tellurite. The thermophysical properties of the components must be matched in order to produce

PCFs from a combination of glass types. Lead/alkaline PCFs could be fabricated without crystallization or fragility problems. Using borosilicate glass alone, PCFs with up to five hollow periodic structures could be formed. With tungsten-tellurite glass, a PCF with one hollow periodic structure and a core doped with Er³⁺ ions have been produced. The properties of this fiber confirm its potential application in optical amplification or in other active devices

Journal of the American Ceramic Society 93[2], 456-460. 2010.

P016-10 “Feshbach projection operator approach to positron annihilation”

Sanchez, S. D., Lima, M. A. P., and Varella, M. T. D.

We present a theory of vibrationally enhanced positron annihilation on molecules based on the Feshbach projection operator formalism. A key aspect of the present approach is the fact that no direct vibrational excitation is assumed, i.e., the attachment mechanism is electronic in nature, arising from positron-electron correlation-polarization forces, and energy transfer to the nuclei essentially follows from the difference between the potential-energy surfaces of the isolated target and the positron-molecule compound; moreover, no a priori assumption is made on the character of the transient (bound or virtual state). An approximate relation between the annihilation parameter $Z(\text{eff})$ and the vibrationally summed cross section is presented, as well as a hierarchy of approximations that may allow for elaborate model calculations. We also discuss how important aspects of the annihilation process are taken into account in the present theory, such as isotope effects, vibrational energy redistribution and relative strengths among vibrational resonances. For completeness, semiempirical model calculations for acetylene and ethylene are presented. Despite the stringent approximations employed in this simplest version of the theory, fair agreement with experimental data was obtained in the vicinity of 0 → 1 thresholds

Physical Review A 80[5]. 052510. 2009.

P017-10 “First proton-proton collisions at the LHC as observed with the ALICE detector: measurement of the charged-particle pseudorapidity density at root s=900 GeV”

Aamodt, K., Abel, N., Abeyssekara, U., Quintana, A. A., Acero, A., Adamova, D., Aggarwal, M. M., Rinella, G. A., Agocs, A. G., Salazar, S. A.,

On 23rd November 2009, during the early commissioning of the CERN Large Hadron Collider (LHC), two counter-rotating proton bunches were circulated for the first time concurrently in the machine, at the LHC injection energy of 450 GeV per beam. Although the proton intensity was very low, with only one pilot bunch per beam, and no systematic attempt was made to optimize the collision optics, all LHC experiments reported a number of collision candidates. In the ALICE experiment, the collision region was centred very well in both the longitudinal and transverse directions and 284 events were recorded in coincidence with the two passing proton bunches. The events were immediately reconstructed and analyzed both online and offline. We have used these events to measure the pseudorapidity density of charged primary particles in the central region. In the range vertical bar eta vertical bar < 0.5, we obtain $dN(\text{ch})/d\text{eta} = 3.10 \pm 0.13(\text{stat.}) \pm 0.22(\text{syst.})$ for all inelastic interactions, and $dN(\text{ch})/d\text{eta} = 3.51 \pm 0.15(\text{stat.}) \pm 0.25(\text{syst.})$ for nonsingle diffractive interactions. These results are consistent with previous measurements in proton-antiproton interactions at the same centre-of-mass energy at the CERN Sp^(p)over bar>S collider. They also illustrate the excellent functioning and rapid progress of the LHC accelerator, and of both the hardware and software of the ALICE experiment, in this early start-up phase

European Physical Journal C 65[1-2], 111-125. 2010.

P018-10 “Glass fission track analysis by AFM and SEM: Inferring latent track structure through etched tracks”

Hadler, J. C., Alencar, I., Lunes, P. J., and Guedes, S.

The main goal of this work is the study of latent fission track structure (or the associated defects density) analyzing the geometry evolution of etched tracks. In this way, measurements of diameter

and cone angle for U-235 fission tracks reaching soda-lime glass surface with normal incidence were made. These glasses were etched since very short etching time up to times around standard etching used for optical microscopy. The measurements were obtained using an Atomic Force Microscope (AFM) and a Scanning Electron Microscope (SEM). Employing a geometrical model to describe track evolution in isotropic materials it was possible to conclude that the defect density in latent tracks can be considered constant along the fission fragment trajectory. (C) 2009 Elsevier Ltd. All rights reserved

Radiation Measurements 44[9-10], 746-749. 2009.

P019-10 "Hole-electron electrical coupling in photorefractive materials" de Oliveira, I., Montenegro, R., and Frejlich, J.

We describe an improved mathematical model for photorefractive materials exhibiting hole-electron competition where the constants accounting for electrical coupling between holes and electrons are independently adjusted for each one of them. Experimental results from photorefractive titanosillenite crystals with hole-electron competition, and particularly from a vanadium doped sample, are shown to be better described by this modified model than by the classical one already reported in the literature

Applied Physics Letters 95[24], 241908. 2009.

P020-10 "Imaging two-dimensional ice-like structures at room temperature" Teschke, O., Valente, J. F., and de Souza, E. F.

In this Letter, we report scanning force microscopy images with sufficient lateral resolution to microscopically identify the distinct ice-like structures on mica at finite humidity. The pattern calculated by Odelius et al. (1997) [1] for bilayers, e. g. a 2D ice-like structure that coincides with the unit cell of mica, was observed at molecular clusters edges and an ice-like with a hexagonal structure at its center. Other regions showing structures with a periodicity of 0.76 +/- 0.07 nm, possibly associated with a rhombohedral structure, and 0.63 +/- 0.06 nm a cubic structure, may be described as regions with compactly bonded intermixed structures. (C) 2009 Elsevier B. V. All rights reserved

Chemical Physics Letters 485[1-3], 133-136. 2010.

P021-10 "Impaired red cell deformability in iron deficient subjects" Brandao, M. M., Castro, M. D. R. B., Fontes, A., Cesar, C. L., Costa, F. F., and Saad, S. T. O.

Iron deficiency is a systemic disorder, which affects a variety of different cell types and is one of the most frequent diseases throughout the world. The influence of iron deficiency upon erythrocyte deformability is controversial and could be a consequence of membrane peroxidation damage or cross linking of membrane proteins. The aim of this study was to determine the overall elasticity (the deformability of the entire cell is evaluated) of iron deficient red blood cells (RBC) using laser optical tweezers. In this study, the laser trapped the cell and the elasticity was then analyzed measuring cell deformation at six different drag velocities. Twenty-five RBCs from 11 healthy blood donors (controls) and 7 patients with iron deficiency anemia were analyzed. Iron deficiency subjects were classified into 3 groups based on Hb concentration for statistical analysis (group I: Hb = 7.0-7.9; group II: 8.0-10.2 and group III: 7.0-10.2 g/dl). The results showed an increased rigidity in the iron deficiency of deficient red blood cells when compared to normal control blood cells, and, this impaired deformability seems to be correlated to the hemoglobin concentration. In conclusion, the results obtained by optical tweezers showed that iron deficiency affects the elasticity of whole RBC

Clinical Hemorheology and Microcirculation 43[3], 217-221. 2009.

P022-10 "Influence of stirring velocity on the synthesis of magnetite nanoparticles (Fe₃O₄) by the co-precipitation method"

Valenzuela, R., Fuentes, M. C., Parra, C., Baeza, J., Duran, N., Sharma, S. K., Knobel, M., and Freer, J.

Superparamagnetic magnetite nanoparticles (mean diameter similar to 10 nm) were synthesized using the co-precipitation route from

Fe²⁺/Fe³⁺ in aqueous solutions (molar ratio 1:2) by adding a base under mechanical stirring at 10.000 rpm. This stirring velocity was found to be suitable for obtaining nanoparticles of this mean size, and a decrease in stirring velocity resulted in a larger size (similar to 19 nm) and a wider size distribution. At 18,000 rpm, in addition to magnetite, goethite is also synthesized in the form of nanoparticles and nanorods are found. At higher stirring velocities (25,000 rpm), the solution's core temperature increased from 20 degrees to 37 degrees C, generating a mixture of non-magnetic iron compounds. (C) 2009 Elsevier B.V. All rights reserved

Journal of Alloys and Compounds 488[1], 227-231. 2009.

P023-10 "Influence of substrate on the magnetic properties of Ni and permalloy sub-micrometric patterned stripes" Duque, J. G. S., Rosa, W. O., Nunes, W. C., de Araujo, A. E. P., Pagliuso, P. G., Cescato, L., Knobel, M., Socolovsky, L. M., and Zysler, R. D.

The magnetic properties of sub-micrometric magnetic structures of Ni and permalloy (Ni₈₀Fe₂₀) patterned stripes are studied as functions of temperature. The samples are produced by combining an interferometric lithographic technique with sputtering. At room temperature, ferromagnetic resonance and hysteresis data indicate the existence of an in-plane uniaxial anisotropy in both samples. The NiFe sample has an easy axis along the stripes direction in the entire studied temperature range (2 < T < 300 K). On the other hand, an interesting change in the easy magnetization direction is observed in Ni samples, from parallel to perpendicular to the axis of the stripes, when the temperature is decreased. The results are interpreted in terms of a competition between shape and magnetoelastic anisotropies

Journal of Physics D-Applied Physics 43[2], 025001. 2010.

P024-10 "Investigation by Combined Solid-State NMR and SAXS Methods of the Morphology and Domain Size in Polystyrene-b-Polyethylene Oxide-b-Polystyrene Triblock Copolymers"

Bonk, F. A., Caldarelli, S., Phan, T., Bertin, D., Deazevedo, E. R., Mantovani, G. L., Bonagamba, T. J., Plivelic, T. S., and Torriani, I. L.

The microphase structure of a series of polystyrene-b-polyethylene oxide-b-polystyrene (SEOS) triblock copolymers with different compositions and molecular weights has been studied by solid-state NMR, DSC, wide and small angle X-ray scattering (WAXS and SAXS). WAXS and DSC measurements were used to detect the presence of crystalline domains of polyethyleneoxide (PEO) blocks at room temperature as a function of the copolymer chemical composition. Furthermore, DSC experiments allowed the determination of the melting temperatures of the crystalline part of the PEO blocks. SAXS measurements, performed above and below the melting temperature of the PEO blocks, revealed the formation of periodic structures, but the absence or the weakness of high order reflections peaks did not allow a clear assessment of the morphological structure of the copolymers. This information was inferred by combining the results obtained by SAXS and H-1 NMR spin diffusion experiments, which also provided an estimation of the size of the dispersed phases of the nanostructured copolymers. (C) 2009 Wiley Periodicals, Inc. *J Polym Sci Part B: Polym Phys* 48:55-64,2010

Journal of Polymer Science Part B-Polymer Physics 48[1], 55-64. 2010.

P025-10 "Laser-dressing and magnetic-field effects on shallow-donor impurity states in semiconductor GaAs-Ga_{1-x}Al_xAs cylindrical quantum-well wires" Lopez, F. E., Reyes-Gomez, E., Porrás-Montenegro, N., Brandi, H. S., and Oliveira, L. E.

The influence of an intense laser field on shallow-donor states in cylindrical GaAs-Ga_{1-x}Al_xAs quantum-well wires under an external magnetic field applied along the wire axis is theoretically studied. Numerical calculations are performed in the framework of the effective-mass approximation, and the impurity energies impurity energies corresponding to the ground state and 2p(+/-) excited states are obtained via a variational procedure. The laser-

field effects on the shallow-donor states are considered within the extended dressed-atom approach, which allows one to treat the problem 'impurity + heterostructure + laser field + magnetic field' as a renormalized 'impurity + heterostructure + magnetic field' problem, in which the laser effects are taken into account through a renormalization of both the conduction-band effective mass and fundamental semiconductor gap

Journal of Physics-Condensed Matter 22[4]. 045303. 2010.

P026-10 "Long Nanofibers Arrays Through Surfactant Self-Assembly" Teschke, O. and de Souza, E. F.

Self assembly of molecules can be a simple and versatile approach that may lead to nanostructures. Here we report the formation of arrangements of exceptionally long nanofibers of cationic surfactant hexadecyltrimethylammonium bromide molecules with highly defined spatial and parallel ordering. Arrangements of similar to 1 μ m long nanofibers were observed by non-contact atomic force microscopy. The long nanofiber patterns form structures in similar to 5x5 μ m regions and consist of similar to 6 nm wide lines. The formation mechanism of the fibers is shown to be the coalescence of isolated surfactant micelles (similar to 3.2 nm diameter in solution) in the convection stream of the surfactant solution drop close to the pinned contact-line region during drying. The size of micelles formed in solution determines the diameter of the deposited fibers. New deposition schemes of micelles forming nanorods on bare silicon previous to the formation of surfactant bilayers are now being investigated based on the data obtained in this work

Journal of Nanoscience and Nanotechnology 10[2], 784-790. 2010.

P027-10 "Long range rapidity correlations and jet production in high energy nuclear collisions" Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J.,

The STAR Collaboration at the Relativistic Heavy Ion Collider presents a systematic study of high-transverse-momentum charged-di-hadron correlations at small azimuthal pair separation $\Delta\phi$ in d+Au and central Au+Au collisions at $\sqrt{s_{NN}}=200$ GeV. Significant correlated yield for pairs with large longitudinal separation $\Delta\eta$ is observed in central Au+Au collisions, in contrast to d+Au collisions. The associated yield distribution in $\Delta\eta \times \Delta\phi$ can be decomposed into a narrow jet-like peak at small angular separation which has a similar shape to that found in d+Au collisions, and a component that is narrow in $\Delta\phi$ and depends only weakly on $\Delta\eta$, the "ridge." Using two systematically independent determinations of the background normalization and shape, finite ridge yield is found to persist for trigger $p(T)>6$ GeV/c, indicating that it is correlated with jet production. The transverse-momentum spectrum of hadrons comprising the ridge is found to be similar to that of bulk particle production in the measured range ($2 < p(T) < 4$ GeV/c)

Physical Review C 80[6]. 064912. 2009.

P028-10 "Longitudinal double-spin asymmetry and cross section for inclusive neutral pion production at midrapidity in polarized proton collisions at $\sqrt{s}=200$ GeV" Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J.,

We report a measurement of the longitudinal double-spin asymmetry A_{LL} and the differential cross section for inclusive $\pi(0)$ production at midrapidity in polarized proton collisions at $\sqrt{s}=200$ GeV. The cross section was measured over a transverse momentum range of $1 < p(T) < 17$ GeV/c and found to be in good agreement with a next-to-leading order perturbative QCD calculation. The longitudinal double-spin asymmetry was measured in the range of $3.7 < p(T) < 11$ GeV/c and excludes a maximal positive gluon polarization in the proton. The mean transverse momentum fraction of $\pi(0)$'s in their parent jets was found to be around 0.7 for electromagnetically triggered events

Physical Review D 80[11]. 111108. 2009.

P029-10 "Longitudinal spin transfer to Lambda and Lambda hyperons in polarized proton-proton collisions at $\sqrt{s}=200$ GeV" Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J., Barannikova, O.,

The longitudinal spin transfer, D-LL, from high energy polarized protons to Lambda and Lambda hyperons has been measured for the first time in proton-proton collisions at $\sqrt{s}=200$ GeV with the STAR detector at the Relativistic Heavy Ion Collider. The measurements cover pseudorapidity, η , in the range $|\eta| < 1.2$ and transverse momenta, $p(T)$, up to 4 GeV/c. The longitudinal spin transfer is found to be $D-LL = -0.03 \pm 0.13(\text{stat}) \pm 0.04(\text{syst})$ for inclusive Lambda and $D-LL = -0.12 \pm 0.08(\text{stat}) \pm 0.03(\text{syst})$ for inclusive Lambda hyperons with $\langle \eta \rangle = 0.5$ and $\langle p(T) \rangle = 3.7$ GeV/c. The dependence on η and $p(T)$ is presented

Physical Review D 80[11]. 111102. 2009.

P030-10 "Low-roughness active microdisk resonators fabricated by focused ion beam" Barea, L. A. M., Vallini, F., Vaz, A. R., Mialichi, J. R., and Frateschi, N. C.

The authors present a new approach for the fabrication of active microdisk resonators using focused ion beam (FIB) followed by selective wet-chemical etching. This efficient technique enables the placement of the devices at any region of a sample and facilitates prototyping of monolithic integration. Also, it allows the production of very smooth walls required by the resonators. High-quality resonators with an active region based on high-gain InGaAsP/InP quantum wells are demonstrated using this technique. Emission in the C-band at whispering-gallery modes is observed

Journal of Vacuum Science & Technology B 27[6], 2979-2981. 2009.

P031-10 "Macroscopic localization lengths of vibrational normal modes in a heuristic DNA model" Paez, C. J., Rey-Gonzalez, R., and Schulz, P. A.

In this work we study the localization of vibrational modes in heuristic models for disordered DNA-like molecules. Within such approach, atomic groups are replaced by renormalized sites connected by effective springs. The oscillation amplitudes at each site are considered and the localization degree of the normal modes is analyzed by means of the participation ratio, as well as the relative fluctuation of an ensemble of disorder realizations for normal modes in different frequency ranges. The present results suggest that the dynamical properties at low frequencies are completely different for double-strand structures compared to single-strand ones. Irrespective to disorder, double-strand molecules show normal modes with macroscopic localization lengths at low frequencies, for a wide range of spring constants considered in the literature, in contrast to the strong localization in single strands

Physical Review B 81[2]. 024203. 2010.

P032-10 "Nernst effect and dimensionality in the quantum limit" Zhu, Z. W., Yang, H., Fauque, B., Kopelevich, Y., and Behnia, K.

The Nernst effect has recently emerged as a very sensitive, yet poorly understood, probe of electron organization in solids(1-4). Graphene, a single layer of carbon atoms set in a honeycomb lattice, embeds a two-dimensional gas of massless electrons(5) and hosts a particular version of the quantum Hall effect(6,7). Recent experimental investigations of its thermoelectric response(8-10) are in agreement with the theory conceived for a two-dimensional gas of massless electrons(5) and hosts a particular version of the quantum Hall effect(6,7). Recent experimental investigations of its thermoelectric response(8-10) are in agreement with the theory conceived for a two-dimensional electron system in the quantum Hall regime(11,12). Here, we report on a study of graphite(13), a macroscopic stack of graphene layers, which establishes a fundamental link between the dimensionality of an electronic system and its Nernst response. In striking contrast with the single-layer

case, the Nernst signal sharply peaks whenever a Landau level meets the Fermi level. Thus, the degrees of freedom provided by finite interlayer coupling lead to an enhanced thermoelectric response in the vicinity of the quantum limit. As Landau quantization slices a three-dimensional Fermi surface, each intersection of a Landau level with the Fermi level modifies the Fermi-surface topology. According to our results, the most prominent signature of such a topological phase transition emerges in the transverse thermoelectric response

Nature Physics 6[1], 26-29. 2010.

P033-10 “New self-dual solutions of SU(2) Yang-Mills theory in Euclidean Schwarzschild space” Mosna, R. A. and Tavares, G. M.

We present a systematic study of spherically symmetric self-dual solutions of SU(2) Yang-Mills theory on Euclidean Schwarzschild space. All the previously known solutions are recovered and a new one-parameter family of instantons is obtained. The newly found solutions have continuous actions and interpolate between the classic Charap and Duff instantons. We examine the physical properties of this family and show that it consists of dyons of unit (magnetic and electric) charge

Physical Review D 80[10]. 105006.2009.

P034-10 “Nickel-Zinc Ferrite from Reverse Micelle Process: Structural and Magnetic Properties, Mossbauer Spectroscopy Characterization” Thakur, S., Kalyal, S. C., Gupta, A., Reddy, V. R., Sharma, S. K., Knobel, M., and Singh, M.

Nickel-zinc ferrite (Ni_{0.58}Zn_{0.42}Fe₂O₄) nanoparticles with an average crystallite size of about 8.4 nm were synthesized by reverse micelle technique. Bulk sample was prepared by annealing nickel-zinc ferrite (NZFO) nanoparticles at 1473 K. Room temperature Mossbauer spectra of NZFO nanoparticles exhibit collective magnetic excitations, while annealed (bulk) NZFO particles have the ferrimagnetic phase. At 5 K, the broad shape of Mossbauer spectral lines for nanoparticles in comparison to bulk particles provide clear evidence of a wide distribution of magnetic fields acting at the Fe³⁺ nuclei in the nanoparticles. Bulk NZFO particles and inner core of nanoparticles exhibit a fully inverse spinel structure with a Neel type collinear spin arrangement, whereas the major feature of the ionic and spin configuration in the grain boundary (surface) region are a nonequilibrium cation distribution and a canted spin arrangement. The cation distribution of nano and bulk particles has been studied by using in-field Mossbauer spectroscopy. The dependence of Mossbauer parameters viz isomer shift, quadrupole splitting, line width, and hyperfine magnetic field on bulk and nano samples has been studied. As a consequence of spin canting and site exchange of cations in the surface shell, the NZFO nanoparticles exhibit a reduced nonsaturating magnetization compared to bulk particles. The thickness of the surface shell of about 1.3 nm estimated from Mossbauer measurement is found to be in agreement with that obtained from magnetization measurements. Finite size effects have implications on the temperature dependence of the saturation magnetization. The fit of the saturation magnetization to the Bloch T^{-3/2} law for nanoparticles yields a Bloch constant larger than the bulk particles. It was found that a better fit is obtained if the exponent of the temperature is in the range of 1.43 to 1.5. The larger value of Bloch constant (b) suggests the possibility of interactions among the nanoparticles. The dynamic ac susceptibility measurement shows the relaxation time T₀ as 1.77 x 10⁻¹³ s. This value is in good agreement with the theoretical value. Such an agreement is possibly as a result of interparticle interaction in nanoparticle sample

Journal of Physical Chemistry C 113[49], 20785-20794. 2009.

P035-10 “Observation of muon intensity variations by season with the MINOS far detector” Adamson, P., Andreopoulos, C., Arms, K. E., Armstrong, R., Auty, D. J., Ayres, D. S., Backhouse, C., Barnett, J., Barr, G., Barrett, W. L.,

The temperature of the upper atmosphere affects the height of primary cosmic ray interactions and the production of high-energy cosmic ray muons which can be detected deep underground. The MINOS far detector at Soudan, MN, has collected over 67 X 10⁶ cosmic ray induced muons. The underground muon rate measured over a period

of five years exhibits a 4% peak-to-peak seasonal variation which is highly correlated with the temperature in the upper atmosphere. The coefficient, alpha(T), relating changes in the muon rate to changes in atmospheric temperature was found to be alpha(T) = 0.873 +/- 0.009(stat) +/- 0.010(syst). Pions and kaons in the primary hadronic interactions of cosmic rays in the atmosphere contribute differently to alpha(T) due to the different masses and lifetimes. This allows the measured value of alpha(T) to be interpreted as a measurement of the K/pi ratio for E-p greater than or similar to 7 TeV of 0.12(-0.05)(+0.07), consistent with the expectation from collider experiments

Physical Review D 81[1]. 012001. 2010.

P036-10 “Optical amplitude multiplexing through parametric amplification in optical fibers” Abbade, M. L. F., Costa, A. L. A., Barbosa, F. R., Durand, F. R., Marconi, J. D., and Moschim, E.

We propose a new technique that uses parametric amplification in optical fibers to combine two binary signals into a single quaternary amplitude-shift keying (4-ASK) signal. We develop a theoretical model to predict the power level distribution of the 4-ASK signals as a function of the extinction ratios of the input binary signals. Computer simulation results agree with the predictions of this theoretical model within a 0.9 dB margin. We also analyze the application of this technique to the generation of quaternary-amplitude optical packets, which are attractive for allowing the label to be transmitted in the same bandwidth and simultaneously to the payload. Our results indicate that such optical packets may be propagated through lengths comparable to those involved in metropolitan area networks. (C) 2009 Elsevier B.V. All rights reserved

Optics Communications 283[3], 454-463. 2010.

P037-10 “Optical emission and its decay time of type-II InP/GaAs quantum dots” Gomes, P. F., de Godoy, M. P. F., Dias, G. O., Iikawa, F., Brasil, M. J. S. P., Cotta, M. A., and Madureira, J. R.

We investigated the optical emission at 2K from InP quantum dots (QDs) grown on GaAs with and without a GaAs capping layer. Uncapped QDs present relatively long emission decay times (4-14 ns). In contrast, dots covered with a GaAs layer present much shorter lifetimes (similar to 1 ns). We analyse those results considering the effects of surface states (non-radiative recombination channel) and intermixing at the interfaces (affecting the electron-hole wave-function overlap). The continuous-wave optical emission spectrum from uncapped dots does not reproduce straightforwardly the dot size distributions obtained by atomic force microscopy measurements, showing an enhancement of the emission from small dots. The result is attributed to the strong dependence of the electron-hole wave-function overlap with the dot size obtained by our calculations

Journal of Physics D-Applied Physics 43[4]. 045303.2010.

P 038-10 “Photon anti-bunching in acoustically pumped quantum dots” Couto, O. D. D., Lazic, S., Iikawa, F., Stotz, J. A. H., Jahn, U., Hey, R., and Santos, P. V.

Although extensive research on nanostructures has led to the discovery of a number of efficient ways to confine carriers in reduced dimensions, little has been done to make use of the unique properties of various nanostructured systems through coupling by means of the controllable transfer of carriers between them. Here, we demonstrate a novel approach for the controllable transfer of electrons and holes between a semiconductor quantum well and an embedded quantum dot using the moving piezoelectric potential modulation induced by an acoustic phonon. We show that this moving potential not only transfers carriers between the quantum well and an array of quantum dots, but can also control their capture and recombination in discrete quantum dot states within the array. This feature is used to demonstrate a high-frequency, single-photon source with tunable emission energy by acoustically transferring carriers to a selected quantum dot

Nature Photonics 3[11], 645-648. 2009.

P039-10 “Photoresists comparative analysis using soft X-ray synchrotron radiation and time-of-flight mass spectrometry” Mendes, L. A. V., Avila, L. F., Menezes, J. W., Pinho, R. R., Lima, C. R. A., Cescato, L., and Rocco, M. L. M.

Positive photoresists are widely used in lithographic process for the fabrication of relief components. When exposed to UV radiation they suffer chemical reactions modifying their chemical and physical properties. Aiming to follow molecular modifications among two different photoresists unexposed and previously exposed to ultraviolet light we have employed spectroscopic techniques coupled with mass spectrometry in the study of the AZ-1518 and AZ-4620 photoresists. The photon stimulated ion desorption (PSID) technique following the S K-edge NEXAFS spectrum was employed at the Brazilian synchrotron light source (LNLS), during single-bunch operation and using time-of-flight mass spectrometry (TOF-MS) for ion analysis. NEXAFS and PSID mass spectra on both AZ-1518 and AZ-4620 photoresists (unexposed and exposed) were obtained and relative desorption ion yield curves determined for the main fragments as a function of the photon energy. They present marked different PSID spectra. Fragments related to the photochemical decomposition of the AZ-1518 photoresist could be clearly identified differently from the AZ-4620. Studies on the hardness of both photoresists were performed using O-2 plasma reactive ion etching (RIE) technique, analyzed by scanning electron microscopy (SEM) and used to explain different desorption yields in the PSID spectra. These results show that the PSID technique is adequate to investigate structural changes in molecular level in different unexposed and exposed photoresists, which is crucial for improving our knowledge about the breakup process. (C) 2009 Elsevier Ltd. All rights reserved

European Polymer Journal 45[12], 3347-3354. 2009.

P040-10 “Polar atomic displacements in multiferroics observed via anomalous x-ray diffraction” Azimonte, C., Granado, E., Terashita, H., Park, S., and Cheong, S. W.

The minute polar atomic displacements in multiferroics are shown to be within the reach of crystallography. A nonconventional methodology with anomalous x-ray diffraction is employed to investigate such displacements in DyMn₂O₅ with giant magnetoelectric coupling and two Intensity differences of a selected Bragg reflection were measured as the direction of electric polarization is switched by a poling field. A significant differential effect, which is strongly enhanced at energies near and above the Mn K edge, was observed near and below the ferroelectric transition temperature, T_c similar to 40 K. The direct participation of ionic displacements in the ferroelectric polarization, particularly the Mn³⁺ sublattice, is demonstrated, dismissing a purely electronic mechanism for the multiferroicity

Physical Review B 81[1]. 012103.2010.

P041-10 “Polymorphic Phases of Natural Fat from Cupuassu (Theobroma grandiflorum) Beans: A WAXS/SAXS/DSC Study”

Silva, J. C., Plivelic, T. S., Herrera, M. L., Ruscheinsky, N., Kieckbusch, T. G., Luccas, V., and Torriani, I. L.

The polymorphic phases of natural fat extracted from cupuassu beans were studied by performing in situ temperature-dependent X-ray scattering experiments and differential scanning calorimetry (DSC) using synchrotron radiation. Cupuassu (*Theobroma grandiflorum*) is a native plant of the *Theobroma* Species originally found in Brazil's Amazon region, with a great potential for utilization in the chocolate industry. The experiments and data analysis were performed using as a reference the known polymorphic phase behavior of cocoa butter. The results led to the identification of cupuassu fat polymorphic crystalline phases. Using the nomenclature generally found in the literature for triacylglycerols (TAGS) systems, these phases were labeled gamma, alpha, beta', and beta in increasing order of melting temperature and stability. Differential scanning calorimetry measurements of fusion temperatures indicated the existence of two beta states in cupuassu fat. These phases were labeled beta(2) and beta(1), following the aforementioned nomenclature. In spite of the different melting points, the existence of a beta(2) -> beta(1) transition could not be proven, due to the great deal of structural similarity of the corresponding X-ray patterns obtained in our experiments. A comparison of our results with those reported for several pure compounds and ternary mixtures

of TAGS indicated that these components are mainly responsible for the cupuassu fat phase behavior. This study provided the first experimental results of an in-situ follow-up of the polymorphic phase transitions and crystallization of fat from Brazilian cupuassu beans, an industrially important natural product

Crystal Growth & Design 9[12], 5155-5163. 2009.

P042-10 “Recent progress and novel applications of photonic crystal fibers” Cerqueira, S. A.

Photonic crystal fibers present a wavelength-scale periodic microstructure running along their length. Their core and two-dimensional photonic crystal might be based on varied geometries and materials, enabling light guidance due to different propagation mechanisms in an extremely large wavelength range, extending to the terahertz regions. As a result, these fibers have revolutionized the optical fiber technology by means of creating new degrees of freedom in the fiber design, fabrication and applicability. This report aims to provide a detailed statement on the recent progress and novel potential applications of photonic crystal fibers

Reports on Progress in Physics 73[2]. 024401. 2010.

P043-10 “Resonant structures based on amorphous silicon suboxide doped with Er³⁺ with silicon nanoclusters for an efficient emission at 1550 nm” Figueira, D. S. L., Mustafa, D., Tessler, L. R., and Frateschi, N. C.

The authors present a resonant approach to enhance 1550 nm emission efficiency of amorphous silicon suboxide doped with Er³⁺ (a-SiO_x << Er >>) layers with silicon nanoclusters (Si-NC). Our results show an important result toward enabling the use of silicon-based material for active photonic component fabrication. Two distinct techniques were combined to fabricate a structure that allowed increasing approximately 12 times the 1550 nm emission. First, layers of SiO₂ were obtained by conventional wet oxidation and a-SiO_x << Er >> matrix was deposited by reactive rf cosputtering. Second, an extra pump channel (l-4(15/2) to l-4(9/2)) of Er³⁺ was created due to Si-NC formation on the same a-SiO_x << Er >> matrix via a hard annealing at 1150 degrees C. The SiO₂ and the a-SiO_x << Er >> thicknesses were designed to support resonances near the pumping wavelength (similar to 500 nm), near the Si-NC emission (similar to 800 nm) and near the a-SiO_x << Er >> emission (similar to 1550 nm) enhancing the optical pumping process

Journal of Vacuum Science & Technology B 27[6], L38-L41. 2009.

P044-10 “Robustness Optimization of Fiber Index Profiles for Optical Parametric Amplifiers” Gabrielli, L. H., Hernandez-Figueroa, H. E., and Fragnito, H. L.

Optical fibers with index profiles that are optimized for broadband double pumped parametric amplifiers are thoroughly investigated. The analysis includes random variations in the radii of the profile along the fiber length (introduced in the fabrication process). By optimizing the fourth order dispersion parameter and the effective area we obtain fiber designs that provide flat spectral gain over 200 nm with 3.5 W pump lasers and, at the same time, have robust operation wavelength against fluctuations of up to 1% in the radii of the index profile. These fibers show positive and very small fourth order dispersion. Our results indicate that in such low dispersion fibers, the sixth order dispersion parameter must be considered in the optimization algorithm

Journal of Lightwave Technology 27[24], 5571-5579. 2009.

P045-10 “Search for Muon-Neutrino to Electron-Neutrino Transitions in MINOS” Adamson, P., Andreopoulos, C., Arms, K. E., Armstrong, R., Auty, D. J., Ayres, D. S., Backhouse, C., Barnes, P. D., Barr, G., Barrett, W. L.,

This Letter reports on a search for $\nu(\mu) \rightarrow \nu(e)$ transitions by the MINOS experiment based on a 3.14×10^{20} protons-on-target exposure in the Fermilab NuMI beam. We observe 35 events in the Far Detector with a background of $27 \pm 5(\text{stat}) \pm 2(\text{sys})$ events predicted by

the measurements in the Near Detector. If interpreted in terms of $\nu(\mu) \rightarrow \nu(e)$ oscillations, this 1.5 sigma excess of events is consistent with $\sin(2)(2\theta(13))$ comparable to the CHOOZ limit when $|\Delta m(2)| = 2.43 \times 10^{-3} \text{ eV}(2)$ and $\sin(2)(2\theta(23)) = 1.0$ are assumed

Physical Review Letters 103[26], 261802. 2009.

P046-10 "Searching for Modular Structure in Complex Phenotypes: Inferences from Network Theory" Perez, S. I., de Aguiar, M. A. M., Guimaraes, P. R., and dos Reis, S. F.

The notion of modularity has become a unifying principle to understand structural and functional aspects of biological organization at different levels of complexity. Recently, deciphering the modular organization of molecular systems has been greatly aided by network theory. Nevertheless, network theory is completely absent from the investigation of modularity of complex macroscopic phenotypes, a fundamental level of organization at which organisms experience and interact with the environment. Here, we used geometric descriptors of phenotypic variation to derive a network representation of a complex morphological structure, the mammalian mandible, in terms of nodes and links. Then, by integrating the network representation and description with random matrix theory, we uncovered a modular organization for the mammalian mandible, which deviates significantly from an equivalent random network. The modules revealed by the network analysis correspond to the four morphogenetic units recognized for the mammalian mandible on a developmental basis. Furthermore, these modules are known to be affected only by particular genes and are also functionally differentiated. This study shows that the powerful formalism of network theory can be applied to the discovery of modules in complex phenotypes and opens the possibility of an integrated approach to the study of modularity at all levels of organizational complexity

Evolutionary Biology 36[4], 416-422. 2009.

P047-10 "Secondary Electron Contrast Modulation in SU-8 Photoresist Films Exposed Holographically" Avila, L. F., Gutierrez-Rivera, L., and Cascato, L.

We report a Secondary Electron (SE) contrast modulation observed in scanning electron microscope photographs of the cross-section of SU-8 photoresist films exposed holographically. The modulation occurs along the whole depth of the sample and its contrast disappears when the samples are submitted to the post exposure bake (PEB). Diffraction and atomic force microscopy measurements of the samples were performed before and after PEB to investigate this modulation. The results indicate that this SE emission contrast modulation comes from the spatial chemical modulation generated by the photolysis during the exposure of the SU-8 films. (C) 2009 Wiley Periodicals, Inc. *J Polym Sci Part B: Polym Phys* 48: 226-230, 2010

Journal of Polymer Science Part B-Polymer Physics 48[2], 226-230. 2010.

P048-10 "SiO₂/TiO₂/Sb₂O₅/graphite carbon ceramic conducting material: preparation, characterization, and its use as an electrochemical sensor" Maroneze, C. M., Luz, R. C. S., Landers, R., and Gushikem, Y.

SiO₂/TiO₂/graphite (STG) electrically conducting material, prepared by the sol-gel processing method, was used as substrate base for the chemical immobilization of Sb(V) by formation of the Ti-O-Sb linkage. The surface modified material, STGSb, was characterized by X-ray photoelectron spectroscopy and scanning electronic microscopy coupled to energy dispersive spectroscopy. The results showed the Sb(V) homogeneously dispersed on the STG matrix surface, with no phase segregation or isolated pure oxide domains. An electrode prepared with the STGSb material was used to adsorb the electroactive cationic dye methyl blue. The modified electrode, STGSb/MB, presented good performance toward electrocatalytic oxidation of the coenzyme beta-NADH (nicotinamide adenine dinucleotide). The electrode was shown to be very stable and allowed

the electrochemical detection of NADH at low electrode potential (-0.14 V), which is an interesting feature of the system since in this potential range it is possible to minimize surface fouling and electrode passivation. The support material (STGSb) has proven to have great potential to be applied in the construction of various new electrochemical sensors based on cationic dyes presenting redox properties

Journal of Solid State Electrochemistry 14[1], 115-121. 2010.

P049-10 "Stability of a pendulum with periodic arbitrary forcing" Quintero-Cabra, P., Silva-Valencia, J., and Aejo-Martinez, H.

Revista Mexicana de Fisica e 55[2], 161-167. 2009.

P050-10 "Structure of chemically prepared poly-(para-phenylenediamine) investigated by spectroscopic techniques"

Sestrem, R. H., Ferreira, D. C., Landers, R., Temperini, M. L. A., and do Nascimento, G. M.

The structure of chemically prepared poly-p-phenylenediamine (PpPD) was investigated by Resonance Raman (RR), FTIR, UV-VIS-NIR, X-ray photoelectron (XPS), X-ray Absorption at Nitrogen K edge (N K XANES), and Electron paramagnetic Resonance (EPR) spectroscopies. XPS, EPR and N K XANES data reveal that polymeric structure is formed mainly by radical cations and dication nitrogens. It excludes the possibility that PpPD chains have azo or phenazinic nitrogens, as commonly is supposed in the literature. The RR spectrum of PpPD shows two characteristic bands at 1527 cm⁻¹ and 1590 cm⁻¹ that were assigned to $\nu \text{ C}=\text{N}$ and $\nu \text{ C}=\text{C}$ of dication units, respectively, similar to polyaniline in pernigraniline base form. The presence of radical cations was confirmed by Raman data owing to the presence of bands at 1325/1370 cm⁻¹, characteristic of $\nu \text{ C}-\text{N}$ of polaronic segments. Thus, all results indicate that PpPD has a doped PANT-like structure, with semi-quinoid and quinoid rings, and has no phenazinic rings, as observed for poly-o-phenylenediamine. (C) 2009 Elsevier Ltd. All rights reserved

Polymer 50[25], 6043-6048. 2009.

P051-10 "Study on the observation of Eu²⁺ and Eu³⁺ valence states in low silica calcium aluminosilicate glasses" Sampaio, J. A., Filadelpho, M. C., Andrade, A. A., Rohling, J. H., Medina, A. N., Bento, A. C., da Silva, L. M., Gandra, F. C. G., Nunes, L. A. O., and Baesso, M. L.

The optical, magnetic and structural properties of Eu doped low silica calcium aluminosilicate glasses were investigated. The optical absorption coefficient presented two bands at 39 246 and 29 416 cm⁻¹, which were assigned respectively to the 4f(7) (S-8(7/2)) -> 4f(6) (4F(J)) 5d (T-2g), and 4f(7) (S-8(7/2)) -> 4f(6) (4F(J)) 5d (E-g) transitions of Eu²⁺. The fluorescence measured at 300 K on a sample doped with 0.5 wt% of Eu₂O₃ exhibited a broad band centered at 17 350 cm⁻¹, which is attributed to the 4f(6)5d -> 4f(7) transition of Eu²⁺, whereas the additional peaks are due to the D-5(0) -> F-7(J) (J = 1, 2, 4) transitions of Eu³⁺. From magnetization and XANES data it was possible to evaluate the fractions of Eu²⁺ and Eu³⁺ for the sample doped with 0.5 and 5.0 wt% of Eu₂O₃, the values of which were approximately 30 and 70%, respectively

Journal of Physics-Condensed Matter 22[5]. 055601. 2010.

P052-10 "Superficial Modification in Recycled PET by Plasma Etching for Food Packaging" Cruz, S. A., Zanin, M., Nascente, P. A. P., and de Moraes, M. A. B.

An oxygen plasma treatment has been used to improve the adhesion of amorphous hydrogenated carbon (a-C:H) films onto surfaces of recycled poly(ethylene terephthalate) (PET). Modifications produced by the oxygen plasma on the PET surface in chemical bonds and morphology were investigated by X-ray photoelectron spectroscopy and atomic force microscopy, respectively. Contact angle measurements were used to study the changes in the surface wettability. Adhesion of the a-C:H film onto the PET surface was investigated by the tape test method. It was observed that the improvement in film adhesion is in good correlation with the increase in surface roughness, due to plasma etching, and with the appearance of oxygen-related functional groups

at the surface. The results of this study indicate that a-C:H-coated recycled PET can be used in food packaging. The a-C:H film could be used as a functional barrier to reduce or prevent migration of contaminants from the polymer to the package content. (C) 2009 Wiley Periodicals, Inc. J Appl Polym Sci 115: 2728-2733, 2010

Journal of Applied Polymer Science 115[5], 2728-2733. 2010.

P053-10 “Synthesis, characterization, and magnetic properties of room-temperature nanofluid ferromagnetic graphite”

Souza, N. S., Sergeenkov, S., Speglich, C., Rivera, V. A. G., Cardoso, C. A., Pardo, H., Momburu, A. W., Rodrigues, A. D., de Lima, O. F., and raujo-Moreira, F. M.

We report the chemical synthesis route, structural characterization, and physical properties of nanofluid magnetic graphite (NFMG) obtained from the previously synthesized bulk organic magnetic graphite (MG) by stabilizing the aqueous ferrofluid suspension with an addition of active cationic surfactant. The measured magnetization-field hysteresis curves along with the temperature dependence of magnetization confirmed room-temperature ferromagnetism in both MG and NFMG samples. (C) 2009 American Institute of Physics. [doi:10.1063/1.3265945]

Applied Physics Letters 95[23]. 233120. 2009.

P054-10 “The Dirac Equation in Six-dimensional SO(3,3) Symmetry Group and a Non-chiral “Electroweak” Theory”

Dartora, C. A. and Cabrera, G. G.

We propose a model of electroweak interactions without chirality in a six-dimensional spacetime with 3 time-like and 3 space-like coordinates, which allows a geometrical meaning for gauge symmetries. The spacetime interval $ds^2 = dx(\mu)dx(\mu)$ is left invariant under the symmetry group SO(3, 3). We obtain the six-dimensional version of the Dirac gamma matrices, $\Gamma(\mu)$, and write down a Dirac-like Lagrangian density, $L = i \bar{\psi} \overline{\Gamma(\mu)} \partial(\mu) \psi$. The spinor ψ can be decomposed into two Dirac spinors, $\psi(1)$ and $\psi(2)$, interpreted as the electron and neutrino fields, respectively. In six-dimensional spacetime the electron and neutrino fields appear as parts of the same entity in a natural manner. The SO(3, 3) Lorentz symmetry group is locally broken to the observable SO(1, 3) Lorentz group, with only one observable time component, $t(z)$. The $t(z)$ -axis may not be the same at all points of the spacetime, and the effect of breaking the SO(3, 3) spacetime symmetry group locally to an SO(1, 3) Lorentz group, is perceived by the observers as the existence of the gauge fields. We interpret the origin of mass and gauge interactions as a consequence of extra time dimensions, without the need of introducing the so-called Higgs mechanism for the generation of mass. Further, in our ‘toy’ model, we are able to give a geometric meaning to the electromagnetic and non-Abelian gauge symmetries

International Journal of Theoretical Physics 49[1], 51-61. 2010.

P055-10 “The nature and enhancement of magnetic surface contribution in model NiO nanoparticles”

Sharma, S. K., Vargas, J. M., De Biasi, E., Beron, F., Knobel, M., Pirola, K. R., Meneses, C. T., Kumar, S., Lee, C. G., Pagliuso, P. G., and Rettori, C.

We report an alternative synthesis method and novel magnetic properties of Ni-oxide nanoparticles (NPs). The NPs were prepared by thermal decomposition of nickel phosphine complexes in a high-boiling-point organic solvent. These particles exhibit an interesting morphology constituted by a crystalline core and a broad disordered superficial shell. Our results suggest that the magnetic behavior is mainly dominated by strong surface effects at low temperature, which become evident through the observation of shifted hysteresis loops (similar to 2.2 kOe), coercivity enhancement (similar to 10.2 kOe) and high field irreversibility (≥ 50 kOe). Both an exchange bias and a vertical shift in magnetization can be observed in this system below 35 K after field cooling. Additionally, the exchange bias field shows a linear dependence on the magnetization shift values, which elucidate the role of pinned spins on the exchange fields. The experimental data are analyzed in terms of the interplay between the interface exchange coupling and the antiferromagnetically ordered structure of the core

Nanotechnology 21[3]. 035602.2010.

P056-10 “Thermal equilibrium of two quantum Brownian particles”

Valente, D. M. and Caldeira, A. O.

The influence of the environment in the thermal equilibrium properties of a bipartite continuous variable quantum system is studied. The problem is treated within a system-plus-reservoir approach. The considered model reproduces the Brownian motion when the two particles are isolated and induces an effective interaction between them, depending on the choice of the spectral function of the bath. The coupling between the system and the environment guarantees the translational invariance of the system in the absence of an external potential. The entanglement between the particles is measured by the logarithmic negativity, which is shown to monotonically decrease with the increase of the temperature. A range of finite temperatures is found in which entanglement is still induced by the reservoir

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Abstracta

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