

Abstracta

Ano V - N. 03

Jun.01



Trabalhos Aceitos para Publicação
A010-01 à A021-01

Trabalho Aceito para Congresso
C003-01

Patentes Registradas
Pi001-01 à Pi003

Trabalhos Publicados
P026-01 à P041-01

[A010-01] “Weighted oscillator strengths and lifetimes for the Ar III spectrum.”

F.R.T. Luna, F. Bredice, G.H. Cavalcanti, A.G. Trigueiros

The weighted oscillator strengths(gf) and the lifetimes for Ar III presented in this work were carried out in a multiconfiguration Hartree-Fock relativistic (HFR) approach. In this calculation, the electrostatic parameters were optimized by a least-squares procedure in order to improve the adjustment to experimental energy levels. This method produces (gf)-values that are in better agreement with intensity observations and lifetimes values that are closer to the experimental ones. In this work we presented all the experimentally known electric dipole Ar III spectral lines.

Journal of Quantitative Spectroscopy & Radiative Transfer 69 (2), 171-188, 2001.

[A011-01] “Urbach’s tail in III-nitrides an electric field.”

Clóves G. Rodrigues, Áurea R. Vasconcellos, V. N. Freire, and Roberto Luzzi

We consider electron-hole recombination in wide gap strongpolar semiconductors of the III-nitride family under high electric fields. The calculated low energy side of the luminescence spectrum displays the so-called Urbach’s tail, which is characterized as resulting from the presence of side bands in the form of replicas of the main band, corresponding to recombination with accompanying emission of one, two, etc., LO phonons. The influence of the nonequilibrium macroscopic state of hot carries and phonons on the luminescence spectrum is evidenced. Our results for a 45kV/cm electric field intensity points to 50, 120, and 220 meV Urbach tail widths in, respectively, wurtzite InN, GaN, and AlN.

Journal of Applied Physics 90 (4), 1879-1882, 2001

[A012-01] “The 3d2 Configuration in Six-Times Ionized Argon, Ar VII.”

A.G. Trigueiros, F. Callegari, and N. Mansur, G. H. Cavalcanti, A. J. Mania, M. Gallardo and J. g. Reyna Almandos.

The transition array 2p63p3d-2p63d2 has identified in the spectrum of magnesium-like Ar VII produced by electrical discharges in the vacuum ultraviolet region, VUV. Twenty five new transitions have been identified as combinations between levels of this transition array. From these transitions we have determined the levels of the 3d2 configuration. It was also possible in determine the 2p63p3d1D20 level that was missed in the early work on the Ar VII spectrum. Hartree-Fock calculations with relativistic corrections were used to predict energy levels and transitions. Isoelectronic comparisons along the Mg I sequence are used to support the experimental results.

Journal of the Optical Society of America B 18 (11), 1718-1721, 2001

[A013-01] “Spectral analysis of the 4d95d and 4d95f configurations in eight times ionized xenon, Xe IX.”

F. Callegari, M. Gallardo, M. Raineri, A. G. Trigueiros, and J. G. Reyna Almandos

A capillary light source was used to observe the spectrum of eight-time-ionized xenon, Xe IX, in the vacuum ultraviolet range, 270-1300 Å. 109 transitions have been identified as combinations between levels of the 4d95d with 4d95p and 4d95f configuration. Seventeen levels have been determined that belong to the 4d95d configuration, and fifteen belong to the 4d95f configuration.

The energy parameters were obtained with Hartree-Fock relativistic calculations. Least-Squares parametric calculation has been carried out to study the fit between experimental and theoretical values.

Journal of Quantitative Spectroscopy & Radiative Transfer 73 (1), 13-22, 2002.

[A014-01] “Laser spectroscopy of calcium in hollow cathode discharge”

R. L. Cavasso-Filho, A. Mirage, A. Scalabrin, D. Pereira, and F. C. Cruz

We investigated the use of hollow-cathode discharges for high-resolution and high-sensitivity spectroscopy, using atomic Calcium. Spectra with sub-Doppler resolution of Ca I transitions at 423 (resonant), 610, 612, 616, 645, 657 (intercombination and 672 nm were obtained by optogalvanic saturation spectroscopy, in lamps filled with Argon (0.6 and 2.5 Torr) and Krypton (0.6 Torr). A Doppler background due to velocity changing collisions, which may severely limit the resolution, can be greatly reduced by the choice of buffer gas. Sub-Doppler linewidths comparable to those achieved in atomic beams have been obtained, making a properly chosen hollow cathode lamp a convenient tool for high resolution spectroscopic experiments, providing wavelength references for laser frequency tuning. The sensitivity of optogalvanic detection and the excitation of most electronic levels by the discharge make them also attractive for investigating weak and/or excited level transitions, with the use of a simple experimental setup.

Journal of the Optical Society of America B 18 (12), 1922-1927, 2001.

[A015-01] “Anisotropic superconducting properties of aligned MgB2 crystallites.”

O. F. de Lima, R. A. Ribeiro, M. A. Avila, C. A. Cardoso and A. A. Coelho

Samples of aligned MgB2 crystallites have been prepared, allowing for the first time the direct identification of an upper critical field anisotropy $H_{c2}^{ab}/H_{c2}^c = x_{ab}/x_c - 1.7$ with $x_{o,ab} - 70$ Å, $x_{o,c} - 40$ Å, and a mass anisotropy ratio $m_{ab}/m_c - 0.3$. A ferromagnetic background signal was identified, possibly related to the raw materials purity.

Physical Review Letters 86 (26), 5974-5977, 2001.

[A016-01] “Entanglement between motional states of a single trapped ion and light”

F.L. Semião, A. Vidiella-Barranco and J.A. Roversi

We propose a generation method of Bell-type states involving light and the vibrational motion of a single trapped ion. The trap itself is supposed to be placed inside a high-Q cavity sustaining a single mode, quantized electromagnetic field. Entangled lightmotional states may be readily generated if a conditional measurement of the ion’s internal electronic state is made after an appropriate interaction time and a suitable preparation of the initial state. We show that all four Bell states may be generated using different motional sidebands (either blue or red), as well as a d e q u a t e i o n i c r e l a t i v e p h a s e s .

Physical Review A 6402 (2), 024305, 2001

[A017-01] “Thermoremanence and ZFC-FC magnetization study of Co-SiO2 granular films”

J.C. Denardin , A. L. Brandl , M. Knobel , P. Panissod , A.B. Pakhomov, H. Liu and X.X. Zhang

A systematic study of Co-SiO₂ granular films by means of Transmission Electron Microscopy (TEM), DC and AC initial magnetic susceptibility and thermoremanent magnetization (TRM) is presented. The experimental results are compared with simulations of zero-field cooled (ZFC) and field cooled(FC) magnetization and TRM curves obtained using a simple model of non-interacting nanoparticles. The simulated ZFC/FC curves, using the actual size distribution obtained from the TEM images, show a different behavior than the experimental magnetic data. The effect of the dipolar interaction among particles introduces a self-averaging effect over some correlation length L, which results in a larger average “magnetic” size of the apparent particles together with a narrower size distribution. The analysis of the ZFC/FC curves in the framework of independent “particle clusters” of volume L³, involving about 25 real particles explains very well the observed difference between the experimental data for the average blocking temperature $\langle T_B \rangle$ and its distribution width with respect to the ones expected from the structural observations by TEM. The experimental TRM curves also differ from those obtained from the theoretical model. Indeed, the experimental TRM starts decreasing at a lower temperature than expected from the model, also indicating the strong influence of dipole-dipole interactions.

Physical Review B 65 (6), 1-8, 2002

[A018-01] “Giant Magnetoimpedance: concepts and recent progress”

Marcelo Knobel and Kleber R. Pirota

The giant magnetoimpedance effect (GMI) consists in drastic changes of the complex impedance of soft magnetic materials upon the application of an external magnetic field. The GMI effect is strongly dependent on the frequency of the applied current and the magnetic anisotropies present in the material, among other factors, which spawn a number of interesting new magnetic phenomena. In this context, one can roughly separate the research on GMI in approximately three aspects: (i) theory;(ii) applications; and (iii) as a tool to investigate other magnetic parameters. In this work, an updated review of all these aspects is given.

Journal of Magnetism and Materials 242-245 (1), 33-40, 2002

[A019-01] “Magnetic and Magneto-transport Properties of Co thin films on Si.”

M. Knobel , J.C. Denardin , H. B. de Carvalho , M.J.S.P. Brasil , A.B.Pakhomov and F.P. Missell.

A systematic study of magnetic and magneto-transport properties of thin Co films on Si is reported in this work. The Co films of thicknesses 30, 160 and 440 Å were prepared by magnetron sputtering from a Co target onto a Si(100) substrate held at room temperature. Resistance, magnetoresistance and Hall effect were measured in the temperature range 5-350 K. Magnetization was measured in the same temperature range using a SQUID magnetometer. Complete surface hysteresis loops were measured from 4 K to 300 K by means of the magneto-optical Kerr effect, in order to follow the behavior of the coercivity and magnetic easy axes of the samples. The transport and magneto-transport properties display a peculiar effect as functions of temperature. The films behave as pure metallic Co below 250 K. However, the resistance drops with heating from 250 K to 280 K, regaining its typical metallic behavior at temperatures higher than 280 K. The thinner the film, the larger is the resistance drop in the temperature interval 250-280K, reaching a factor of 4.5 for the 30 Å thick film. The Hall effect contains both ordinary and extraordinary contributions. From ordinary Hall effect measurements, one finds that the conduction is electronic at low temperatures and turns to holelike above the transition point. Magnetoresistance changes from negative at low T to positive at high temperatures. These facts

indicate that the observed effect is related to the metallic layer, which undergoes a conducting channel switching when the temperature is increased.

Physica Status Solidi 187 (1), 177-188, 2001

[A020-01] “On the Structure of Physical Space.”

Daniel Wisnivesky

In this paper we develop a theory based on the postulate that the environment where physical phenomena take place is the space of four complex parameters of the linear group of transformations. Using these parameters as fundamental building blocks we construct ordinary space time and the internal space. Lorentz invariance is built in the definition of external space, while the symmetry of the internal space, $S(1) \times SU(2)$ results as a consequence of the identification of the external coordinates. Thus, special relativity and the electroweak interaction symmetry ensue from the properties of the basic building blocks of physical space. Since internal and external space are derived from a common structure, there is no need to bring into the theory any additional hypothesis to account for the microscopic nature of the internal space, nor to introduce symmetry breaking mechanisms that would normally be required to force a splitting of the internal and external symmetries. As an outcome of the existence of a basic structure underlying the external space-time, the weak and electromagnetic coupling constants are not independent and the Weinberg weak mixing angle is derived from the theory. In this new theory, there is an interrelationship between external and internal transformations, which leads to the quantization of electric charge. Finally we conclude that the electroweak gauge theory can be regarded as a consequence of Einstein General Theory of Relativity. The proposed theory represents an extension of the normally accepted theory and includes it as a particular case. This paper is an attempt to formulate a new framework in which the physical phenomena take place, and to explore some of its consequences.

International Journal of Modern Physics A 16 (24), 4045-4055, 2001

[A021-01] “Nonlinear Hanle Effect in an open V-type level System.”

F. C. Cruz and D. Pereira

We carried out an exact density matrix analysis for the nonlinear Hanle effect in an open V-type system. Steady-state analytical solutions of the Liouville equation have been obtained and the dependence of the populations of the upper and lower states on the applied magnetic field is discussed. These curves, corresponding to experimental ones when fluorescence or absorption is detected, are dependent on the excitation and decay rates and can be used as a tool for analyzing population inversion in laser transitions.

Journal Physics B 34 (15), 3107-3118, 2001

ACCEPTED PAPERS FOR CONFERENCE

[C003-01] “New Equilibrium Solutions and Chaotic Behavior of Kirchhoff Filaments”

Alexandre F. Fonseca, and Marcus A. M. de Aguiar

We study the equilibrium configurations of Kirchhoff filaments with periodic varying Young's and Shear moduli. The differential equations describing the filaments are non-integrable and may exhibit chaotic behavior. We show that the total energy of the rod might present more than just one global minimum, indicating the appearance of new stable solutions. The Poincaré maps show

that some of these new configurations are chaotic. We comment on applications of this work in understanding DNA conformation and folding.

In: **Sixth SIAM Conference on Applications of Dynamical Systems, 20-24 May, 2001**

REGISTERED PATENTS

[Pi001-01] “Bio-Óleo para emprego de Insumos para a Indústria Química”

J.D. Rocha e C.A. Luengo

PI No : 9804166-5 (07/10/1998)

Este invento é um processo que visa o aumento da eficiência de transformação de biomassa em energia, combustíveis e insumos químicos e diminuição das emissões de poluentes atmosféricos principalmente o CO₂, gás do Efeito Estufa, e vapores orgânicos na conversão de biomassa.

[Pi02-01] “Processo de Obtenção de Piches de Alcairão de Hulha Precursores de Piche Mesofásico.”

A.T. Gontijo, C. Otani, e C.A. Luengo

PI No : 9605876-5 (27/11/1996)

A invenção consiste no emprego de óleos ricos em naftaleno, em substituição à quinolina, no pré-tratamento do piche de alcairão de hulha. As misturas piche mole/solventes foram submetidas a aquecimento, à temperaturas inferiores a 100°C e sob agitação constante, durante um intervalo de tempo suficiente para que a digestão ocorresse, seguida de centrifugação e destilação, para recuperação dos solventes. Os resultados mostraram a obtenção de piches com teores de insolúveis em quinolina inferiores a 1%, adequados à obtenção de piche mesofásico, a ser usado como um precursor de materiais carbonosos avançados (MCA), possibilitando uma redução de aproximadamente 70% no custo da matéria prima.

[Pi03-01] “Processos de Obtenção de Microtubos de Carbono e de Microtubos Ativados de Carbono a partir de Piche de Alcairão de Eucalipto.”

G. Capobianco, C.A. Luengo, C. Otani, S. Otani, H.A. Polidoro,

0100257-0B1 (04/01/2001)

Patente de invenção de um processo de obtenção de microtubos de carbono e de microtubos de carbono ativados a partir de piche vegetal, via preparação prévia do piche, fiação por fusão contínua seguida de diversas e adequadas etapas de tratamentos térmicos. O processo inicia-se com a preparação do piche vegetal bruto mediante uma digestão com solução de água/álcool (40:60) seguida de filtração e secagem a 100°C/2 h. A fiação contínua de fibra de piche a 217-219°C, através de uma fiadeira com orifício de 0,45 mm e bobinamento a uma velocidade de 100 à 150 m/min, seguida de tratamentos térmicos de estabilização a temperaturas de 80°C por 4h, 120°C por 4h e 270°C por 4h em atmosfera de ar, carbonização a temperaturas na faixa de 700 a 900°C em fluxo de nitrogênio. Esse processo permite a obtenção de fibras de carbono com cavidade cilíndrica concêntrica ao eixo da fibra, ao longo da sua extensão longitudinal, e que devido a essa característica é denominado de microtubo de carbono. O processo é inovador e vantajoso em relação ao que existe, uma vez que se permite obter microtubos com diâmetro de 10 a 20µm em comprimentos desejados, com custo relativamente baixo. Esse produto é tipicamente material para ser usado como reforço na produção de artefatos de compósitos de baixo peso específico. Quando um processo de ativação com vapor de água a 850°C durante 15 minutos e adicionado de maneira contínua de

carbonização, converte-se as fibras de carbono em microtubos de carbono ativadas. Os microtubos de carbono apresentam-se com massa específica de 0,11 g/cm³ e área superficial específica de 1.073 m²/g e é material aplicável na produção de membranas filtrantes, ou suportes de catalisadores aglomerados na forma de papel, de não tecidos ou soltos, simplesmente, na forma de fibras picadas.

PUBLISHED PAPERS

[P026-01] “Contrast and sensitivity enhancement in Photothermal Reflectance Microscopy through the use of specific probing wavelengths: applications to microelectronics.”

Batista, J. A., Takeuti, D., Mansanares, A. M., and da Silva, E. C. In this paper we show that the use of specific wavelengths, adapted to the particular application, can enhance sensitivity in Photothermal Reflectance measurements. Furthermore, since the sign of the effective temperature reflectance coefficient may change from region to region in the investigated area, a significant contrast can be achieved. The temperature reflectance coefficient of three materials, namely, gold, crystalline silicon, and polycrystalline silicon on silicon, are presented and analyzed as a function of the wavelength.

The Japan Society for Analytical Chemistry 17, S73-S75. 2001.

[P027-01] “Optothermal interference technique applied to the investigation of transparent layered structures”

Batista, J. A., Mansanares, A. M., da Silva, E. C., Vaz, C. C., and Miranda, L. C. M.

This paper shows the enhanced sensitivity of the optothermal interference technique in the detection of local differences (non-homogeneity in thickness and optothermal parameters), compared to the conventional optical interference, when investigating layered transparent structures. The measured signal is sensitive to the reflectance variation at the distinct interfaces, function of temperature, as well as to the optical phase lag between the reflected beams. Measurements made on solar cells show contrast of the order of 100% in the optothermal interference, while the conventional optical interference presents a contrast of only 15%. A model based on the reflectance variation at each interface describes the signal behavior as a function of modulation frequency.

The Japan Society for Analytical Chemistry 17, S76-S79. 2001.

[P028-01] “Simultaneous determination of the thermal properties for liquid and pasty materials from photopyroelectric measurements.”

Pereira, J. D., da Silva, E. C., Mansanares, A. M., and Miranda, L. C. M.

In this work we are proposing a new experimental configuration based in the use of two sensors to allow the simultaneous measurement of both thermal diffusivity and effusivity of the sample. This Dual Sensor Photopyroelectric - DSPPE configuration implies in a single experiment and any calibration is required. Temperature dependent experiments are allowed from a cell equipped with Peltier elements. Substituting the upper sensor for a quartz window spectroscopic experiments are permitted. Water and margarine with different fat content were used as testing samples.

The Japan Society for Analytical Chemistry 17, S172-S174. 2001.

[P029-01] "Inversion in the change of the refractive index near the nematic-isotropic phase transition in lyotropic liquid crystal."

Pereira, J. R. D., Palangana, A. J., Mansanares, A. M., da Silva, E. C., Bento, A. C., and Baesso, M. L.

This work demonstrates the occurrence of dn/dT inversion from negative to positive near the nematic-isotropic phase transition in lyotropic liquid crystal. It is suggested that this effect is attributed to the sudden increase of the electronic polarizability due to a change in the micelles shape near this phase transition. It is also shown the formation of long lasting lens-like element within the sample when it is irradiated at moderately high laser powers. This permanent lens is erasable by increasing the temperature above the nematic- isotropic transition temperature.

The Japan Society for Analytical Chemistry 17, S175-S177. 2001.

[P030-01] "Thermal diffusivity measurements for two media systems with thermal lens technique in the two lasers mismatched mode"

Bernal-Alvarado, J., Pereira, R. D., Mansanares, A. M., and da Silva, E. C.

The thermal lens signal produced by a two media system - two thin samples in a sandwich-like array - is experimentally investigated. A combination of materials presenting selffocusing and self-defocusing lens behavior were studied, and their distinct thermal diffusivities produced composed thermal lens with different characteristic times. A model considering a linear combination of thermal lenses is proposed. It adjusts very well the experimental data, giving the thermal diffusivities of each component, provided no net axial heat flux is present. The validity of the model is discussed and it is applied to the characterization of thin films grown on glass substrate.

The Japan Society for Analytical Chemistry 17, S178-S180. 2001.

[P031-01] "Crystallinity changes evidence in modified and dyed Poly(ethylene terephthalate) films monitored by photothermal method"

Olenka, L., da Silva, E. N., dos Santos, W. L. F., Rubira, A. F., Muniz, E. C., Medina, A. N., Cardoso, L. P., Baesso, M. L., Miranda, L. C. M., and Bento, A. C.

The thermal properties of some modified poly (ethylene terephthalate)-PET films were measured for a set of samples by changing preparation conditions such as temperature and time of surface modification (first step), and also time and temperature of dyeing (second step). Samples were modified with N,N-dimethylacrylamide for incorporating the dye Blue Samaron HGS. From the results of thermal diffusivity and specific heat we were able to point that the PET film improved their heat conduction after dyed at temperature below 70 degreesC (glass transition) for a time of dyeing of 30 min. While for the set dyed above T-g the thermal diffusivity decreases drastically for a 6 hour swelling time. This behavior indicates microstructural variation followed by crystallinity changes in the polyester chains, sensed by the thermal diffusivity. This crystallinity changes evidence was confirmed from x-ray analysis

Analytical Sciences 17, S387-S389. 2001.

[P032-01] "Characterization of diamond fluorinated by glow discharge plasma treatment"

Durrant, S. F., Baranauskas, V., Peterlevitz, A. C., Castro, S. G., Landers, R., and de Moraes, M. A. B.

The surface fluorination of diamond by treatment in glow discharge plasmas of CF₄ for different times has been investigated. High quality diamond films were deposited onto silicon substrates using hot filament chemical vapor deposition (HFCVD). Subsequently, the films were exposed to a radiofrequency glow discharge plasma of CF₄ for the times ranging from 5 min to 1 h. The effects of plasma treatment on the surface morphology, diamond quality and elemental composition were investigated using atomic force microscopy (AFM), Raman spectroscopy and X-ray photoelectron spectroscopy (XPS), respectively. Differences in film roughness caused by the plasma treatment were detected by AFM and confirmed by scanning electron microscopy (SEM). Raman spectroscopic analyses showed that the original diamond was of high quality and that the bulk of each film was unchanged by the plasma treatment. Analyses using XPS revealed increased surface fluorination of the films at longer treatment times. In addition, the density of free radicals in the films was probed using electron paramagnetic resonance spectroscopy (EPRS), revealing that untreated diamond possesses an appreciable density of free radicals (6×10^{12} g⁻¹) which initially falls with treatment time in the CF₄ plasma but increases for long treatment times.

Diamond and Related Materials 10[3-7], 490-495. 2001.

[P033-01] "Influence of stress on the electron core level energies of noble gases implanted in hard amorphous carbon films"

Lacerda, R. G., Hammer, P., Alvarez, F., and Marques, F. C.

In this work, we report the influence of the structural properties of the amorphous carbon matrix on the core-level electrons of implanted noble gases (Ar, Ne and Kr) used in the sputtering deposition process. The films were prepared in an ion beam-assisted deposition chamber (IBAD) including two Kaufman ion sources. Some fractional noble gas is trapped in the film during the assisted deposition and is subjected to the highly strained environment of the carbon matrix. X-Ray photoelectron spectroscopy shows that the noble-gas core-level energies shift linearly to lower binding energies with increasing compressive stress. It is suggested that these shifts are caused by compression of the outer valence wave- function of the implanted gas and by an extra-screening effect from valence electrons of the host atoms. The use of noble-gas core-level energy is proposed as a probe to determine the film stress.

Diamond and Related Materials 10[3-7], 956-959. 2001.

[P034-01] "Annihilation probability density in positron scattering by He"

Varella, M. T. D., de Carvalho, C. R. C., Lima, M. A. P., and da Silva, E. P.

We have calculated annihilation probability densities in positron collisions against the He atom. Our scattering wave functions were obtained with the Schwinger multichannel method [J, S. E. Germano and M. A. P. Lima. Phys. Rev. A 47, 3976 (1993)]. It has been found that direct annihilation, in which electronic cloud deformation shields the nuclear repulsive potential effectively attracting the positron to a binary encounter, dominates the annihilation process at low impact energies. Closer to the real positronium formation threshold, the signature of virtual positronium has been noticed. At room temperature, significant annihilation probability has been observed over a somewhat extended region.

Physical Review A 63[5], 052705. 2001

[P035-01] "Application of the method of continued fractions to electron scattering by polyatomic molecules"

Ribeiro, E. M. S., Machado, L. E., Lee, T. M., and Brescansin, L.M.

A new computational code based on the method of continued fractions is developed to study low-energy electron scattering by polyatomic molecules with arbitrary symmetry. As a first application, this code is used to study elastic electron scattering by four representative molecules with different symmetries, viz., H₂, CH₄, H₂O, and NH₃. The calculated physical quantities such as reactance K matrices, differential cross sections, etc, converge rapidly. Also, our calculated cross sections are in good agreement with other available theoretical and/or experimental data, confirming that this is an efficient method for studying electron molecule scattering.

Computer Physics Communications 136[1-2], 117-125. 2001.

[P036-01] "The chromium spin density wave: magnetic X-ray scattering studies with polarisation analysis"

Mannix, D., de Camargo, P. C., Giles, C., de Oliveira, A. J. A., Yokaichiya, F., and Vettier, C.

We report on X-ray magnetic diffraction studies of the spin density wave antiferromagnetism formed in the conduction electron band of chromium. Non-resonant X-ray magnetic scattering was used to directly determine that chromium has zero orbital magnetisation. Furthermore, the azimuthal dependence of this scattering provides unique evidence that chromium forms a linearly polarised wave. In the vicinity of the K absorption edge, resonant X-ray magnetic scattering was observed. A consistent model of the magnetic scattering has been derived from the resonant and non-resonant magnetic amplitudes. The enhancement of the magnetic intensity arises primarily from dipole transitions from the core 3s level to 4p states. Quadrupole transitions to the magnetic 3d states are essentially non-existent due to their sensitivity to (and the absence of) orbital moment. This effect is predicted from atomic considerations of the 3d(L = 0) transition metal ions.

European Physical Journal B 20[1], 19-25. 2001.

[P037-01] "Possible mixed valence behavior of CeIr₂Ga and YbIr₂Ga"

Petrovic, C., Hundley, M. F., Movshovich, R., Pagliuso, P. G., Sarrao, J. L., Thompson, J. D., Fisk, Z., Garcia, A., Granado, E., Torriani, I., and Rettori, C.

We report possible mixed valence behavior in the new ternary compounds CeIr₂Ga and YbIr₂Ga. These materials crystallize in the hexagonal Na₃As structure of space group P6₃cm. Magnetization, specific heat and transport measurements show reduced magnetic moments and the absence of magnetic order above 0.04K. The quasi-2D structure of these compounds offers the possibility for investigating the role of spatial dimensionality on mixed valence phenomena.

Journal of Magnetism and Magnetic Materials 225[3], 317-321. 2001.

[P038-01] "A 2.3 to 25 keV XAS beamline at LNLS"

Tolentino, H. C. N., Ramos, A. Y., Alves, M. C. M., Barrea, R. A., Tamura, E., Cezar, J. C., and Watanabe, N.

The LNLS XAS beamline has been operating for external users since July 1997. Many facilities and improvements have been progressively added to it, extending the range of applications. Here, a technical description of the main beamline components is given, and results concerning important points,

such as available flux at low and high energies, harmonic contamination, energy resolution and stability, are presented. Some key results are given to demonstrate the beamline performance and limitations. It is shown that the beamline can cover a large energy range, starting from the rather low energy of 2.3 keV up to 25 keV.

Journal of Synchrotron Radiation 8, 1040-1046. 2001.

[P039-01] "Electrochromism in lithiated nickel oxide films deposited by rf sputtering"

Urbano, 25 A., Ferreira, F. F., deCastro, S. C., Landers, R. Fantini, M. C. A., and Gorenstein, A.

Lithiated nickel oxide films were deposited by rf sputtering from an LiNiO₂ target. Different samples were obtained by changing the deposition atmosphere or rf power during deposition, all other parameters remaining constant. The electrochemical/electrochromic performance during lithium extraction/insertion was investigated using aprotic electrolytes, over the whole stability range of the electrolyte. The results showed that all films, independent of the deposition conditions, were electrochemically active. Films deposited under pure Ar atmosphere and high rf power or under Ar + O₂ atmosphere and low power did not present significant electrochromic activity, and the valence band photoelectron spectrum did not show the presence of the Ni 3d line for the as-grown samples. In contrast, samples deposited under Ar + O₂ atmosphere and high power, or pure Ar atmosphere and low power showed a 70% transmittance change, and a stable voltammetric profile after some cycles. For these samples, the valence band photoelectron spectrum clearly presented the Ni 3d line. The electron population at the Ni 3d levels in the as-grown state seems to be responsible for the electrochromic ability.

Electrochimica Acta 46[13-14], 2269-2273. 2001.

[P040-01] "Electrochromic properties of NiO-based thin films prepared by sol-gel and dip coating."

Martini, M., Brito, G. E. S., Fantini, M. C. A., Craievich, A. F., and Gorenstein, A.

A new method for chemical deposition of NiO_xHy-based films was developed. The films obtained have electrochromic properties and good adhesion to the substrate. The precursor sol consists of an alcoholic solution of NiCl₂ and Ti alcoxide. Films deposited on indium-tin-oxide substrates were prepared by dip coating. The electrochromic efficiency of thin films prepared under different conditions was determined. We report on the effects of (a) Ni concentration, (b) Ti content and (c) temperature of firing on the electrochromic efficiency. Electrochromic efficiencies measured at $\lambda = 632.8$ nm of films with different thicknesses (similar to 100-200 nm) range from 10 to 42 cm² C⁻¹, with a variation in transmittance up to 30%. The colouring response time is strongly dependent on Ti content. For Ti-doped films this time is 5-80 times longer than for undoped ones. The variations in monochromatic transmittance during voltammetric cycles suggest that all the electric charge consumed by redox reactions is involved in the colouring process.

Electrochimica Acta 46[13-14], 2275-2279. 2001.

[P041-01] "Inverted hierarchy of neutrino masses disfavored by supernova 1987A"

Minakata, H. and Nunokawa, H

We discuss the flavor conversion of supernova neutrinos in the three-flavor mixing scheme of neutrinos. We point out that by neutrino observation from supernova one can discriminate the inverted hierarchy of neutrino masses from the normal one if $s(13)(2)$ greater than or similar to a few $\times 10(-4)$, irrespective of which oscillation solution to the solar neutrino problem is realized in nature. We perform an analysis of data of SN1987A and obtain a strong indication that the inverted mass hierarchy is disfavored unless $s(13)(2)$ less than or similar to a few $\times 10(-4)$.

Physics Letters B 504[4], 301-308. 2001.

Abstracta

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Publicação

Biblioteca do Instituto de Física Gleb Wataghin

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Projeto Gráfico

ÍgneaDesign

Impressão

Gráfica Central - Unicamp