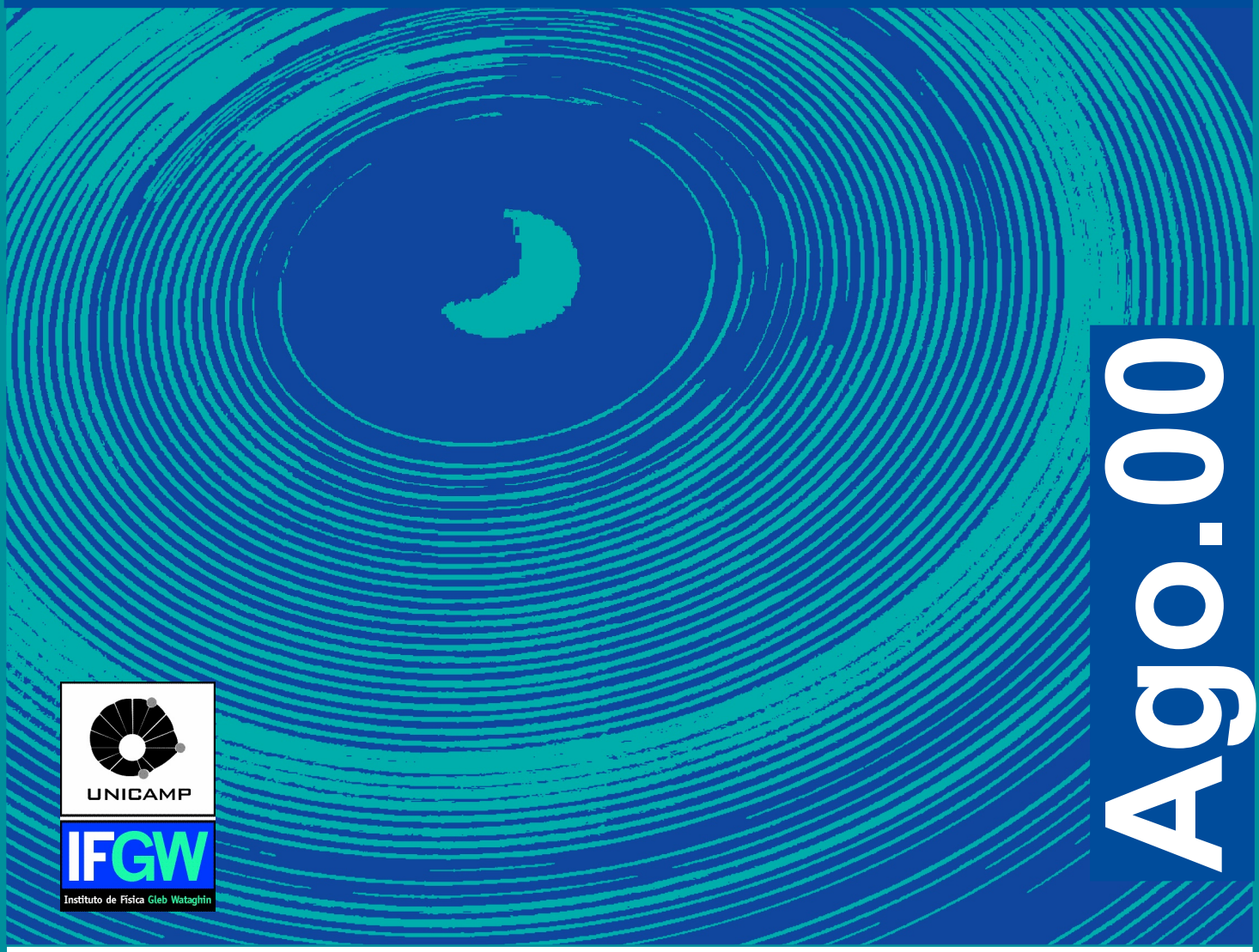
Abstracta

Ano IV - N. 04



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Trabalhos Aceitos para Publicação

A040-00 à A046-00

Trabalhos Aceitos para Congresso

C012-00 à C014-00

Trabalhos Publicados

P001-00 à P004-00

ACCEPTED PAPERS

[A040-00] "Preparing and characterizing biocarbon electrodes (BCE)."

A.R. Coutinho, J. D. Rocha, C. A. Luengo.

In this research eucalyptus wood is used as a source of coke(charcoal) and pitch (biopitch) feedstocks for the production of graphite-like materials. The wood process starts with batch pyrolysis of Eucalyptus saligna wood samples heated up to 1000oC under a heating rate of 3oC.min-1. Volatiles are condensed to give an organic tar (bio-oil), and later distilled to recover heavier fractions that are used as a binder in the electrodes manufacture. The solid charcoal is ground and compressed together with biopitch. The pre-molded green electrode is 25 mm diameter and 120 mm long. It is read to be cured in an increasing temperature treatment. The next step is the calcination at 1000oC, followed by graphitization at 2700oC. The material presented a turbostratic matrix. The molecular structure is monitored by x-ray diffraction, the linewidths of (002) and (100) lines indicate values of Lc = 12,4 nm and La = 56,5 nm. The electrical resistivity of the biocarbon samples, treated at heat temperatures (HTT's) larger than 900oC, presented values of 10-4 W.m. Compression tests indicate that Young's modulus has a maximum of 3.0 GPa at HTT of 1000oC. The rupture strength also goes through a maximum of 50 MPa at similar HTT. Thermal expansion measurements indicate a linear coefficient of 6.10-6 oC-1 for the heat-treated samples at 2700oC. In this work it is made a comparison between the biocarbon electrode (BCE) and a traditional electrode from coal and petroleum derivatives. We find out that an ordinary electrode to scratch furnace has comparable properties to BCE. The main propose of this research is to prove that electrodes can be made from renewable sources and, in this way, decrease pollutent emissions in the industrial processes.

Fuel Processing Technology 67 (2), 93-102, 2000

[A041-00] "Partículas Finas:Superparamagnetismo e Magnetoresistência Gigante."

Marcelo Knobel.

É dada uma breve introdução ao fenômeno conhecido por superparamagnetismo. São discutidos alguns conceitos básicos, são desenvolvidos alguns conceitos fundamentais e são fornecidas referências para um aprofundamento no assunto. É aprofundada a discussão sobre sistemas granulares que apresentam magnetoresistência gigante, com o objetivo de ilustrar a complexidade e importância científica e tecnológica destes sistemas nanocristalinos.

Revista Brasileira de Ensino de Física 22 (3), 387, 2000

[A042-00] "Magnetic Properties and Giant Magnetoimpedance in a CoFeSiB Glass-Covered Microwire."

K.R. Pirota, L. Krausb, H. Chiriac and M. Knobel.

The influence of current annealing on magnetic properties of Joule-heated amorphous Co68.25Fe4.5Si12.25B15 glass-covered microwire (29.3 mm) is investigated. Annealing without applied stress can produce short range order relaxation and consequently improves the sample's soft magnetic properties. The maximum relative change of impedance measured for a drive current frequency of 15 MHz is about 600% with a maximum slope sensitivity of 4%/A.m-1 (about 320%/Oe) for special annealing conditions (10 min annealing with applied current Ia =70 mA). This value is about 10 times higher then the maximum value so far reported for glass covered microwires.

Journal of Magnetism Magnetic Materials 221 (3), L243-L247, 2000

[A043-00] "Scars of the Wigner function."

Fabricio Toscano, Marcus A. M. de Aguiar and Alfredo M. Ozorio de Almeida.

We propose a picture of Wigner function scars as a sequence of concentric rings along a two-dimensional surface inside a periodic orbit. This is verified for a two-dimensional plane that contains a classical orbit of a Hamiltonian system with two degrees of freedom. The orbit is hyperbolic and the classical Hamiltonian is "softly chaotic" at the energies considered. The stationary wave functions are the familiar mixture of scarred and random waves, but the spectral average of the Wigner functions in part of the plane is nearly that of a harmonic oscillator and individual states are also remarkably regular. These results are interpreted in terms of the semiclassical picture of chords and centres, which leads to a qualitative explanation of the interference effects that are manifest in the other region of the plane.The qualitative picture is robust with respect to a canonical transformation that bends the orbit plane.

Physical Review Letters 86 (1), 59-62, 2000

[A044-00] "Scaling analysis of magnetization curves based on collective flux creep for Yba2Cu3O7-d"

R. A. Ribeiro and O. F. de Lima.

We have explored a new way of interpreting relaxation effects in magnetization curves taken as a function of temperature, for several fixed magnetic fields, in Field-Cooling-Warming experiments using an YBa2Cu3O7-d sample. The thermally activated motion of vortices was studied, through a scaling analysis based on collective pinning theory. An intriguing monotonic increase of diamagnetism, while the sample is heated under an applied field, was explained by a relaxation process such that flux exit prevails over flux entry into the sample.

Physica C 354 (1), 227-231, 2001

[A045-00] "Strong dependence of superconducting transition temperature on the ionic size of Rare Earth (RE) in (RE)BaSrCu3O7 (RE = Y, Dy, Nd and La)"

V. P. S. Awana, S. K. Malik, C. A. Cardoso, O. F. de Lima, A. Sedky, W. B. Yelon, and A. V. Narlikar.

The REBaSrCu3O7 compounds with RE = Y, Dy, Nd and La have been synthesized by the standard solid state reaction route. Superconducting transition temperature (Tc), as measured by AC susceptibility technique, is 81K, 79K, 64K and 45K for samples with RE = Y, Dy, Nd and La, respectively. Rare earth dependence of Tc in REBaSrCu3O7 series is quite different than that observed in REBa2Cu3O7 (RE:123) series where Tc is nearly independent of the choice of the RE (except when RE = Ce, Pr and Tb). Neutron diffraction studies have been carried out on the REBaSrCu3O7 compounds and structural details have been obtained from the Rietveld analysis of the room temperature neutron diffraction data. The compounds with RE = Y, Dy are found to crystallize in the orthorhombic RE:123 structure (space group Pmmm) with orthorhombicity considerably smaller than that of the RE:123 compounds. In fact, the orthorhombicity reduces so much that the REBaSrCu3O7 compounds with light rare earth, RE = La and Nd, are tetragonal or almost tetragonal.

Modern Physics Letters B 14 (10), 361-372, 2000

[A046-00] "Comments on ´Experimental proof of standart electrodynamics by measuring the self-force on a part of a current loop´[Phys. Rev. E 58, 2505 (1998)]"

A.K. T. Assis

We discuss Cavalleri´s et al. paper on the measurement of a force on part of a closed circuit carrying a constant current.

Physical Review E 62 (5), 7544, 2000

ACCEPTED PAPERS FOR CONFERENCE PRESENTATION

C 012-00 Magnetostriction and GMI in joule-heated CoFeSiB glass-covered microwires.

K. R. Pirota, L. Kraus, H. Chiriac and M. Knobel.

Magnetic properties (magnetostricition and hysteresis loops) and giant magnetoimpedance (GMI) are investigated in CoFeSiB amorphous glass-covered microwires Joule-heated with or without axial applied stress.

Journal of Magnetism and Magnetic Materials 226-230 (1), 730-732, 2001

C 013-00 Josephson coupling between superconducting clusters in high-Tc materials.

O. F. de Lima, V. P. S. Awana, R. A. Ribeiro, M. A. Avila

Diamagnetic moment for Bi2Sr2CaCu|2O8+d (Bi:2212) and YBa2Cu3O7-d (Y:123) crystals were measured at different fields H and temperatures. For the higher fields two distinct transition temperatures Tg and TJ are identified, with Tg > TJ. By increasing H the line Tg(H) shifts very slowly while TJ(H) shifts much faster to lower temperatures, displaying an upward curvature well described by a theory based on Josephson coupling between superconducting clusters. Here we show data mainly for the Bi:2212 crystals, where sample dependent TJ(H) lines are clearly observed.

Journal of Magnetism and Magnetic Materials 226 (367-369), 2001

C 014- 00 A generalized Roosbroecke-Shockley relation for III-nitrides in far-from equilibrium.

A.R. Vasconcellos, C. G. Rodrigues, V. N. Freire, and R. Luzzi, J. A. P. Costa.

Large gap semiconductors of the III-Nitrides family are presently receiving particular attention due to their technological applications in blue/UV light emitting diodes and diodes lasers. The properties of far-from-equilibrium carriers in these systems are a matter of interest since the knowledge of their evolution to the steady state is very important for the design improvement of their devices. Recently, heating of photogenerated electrons and holes in highly excited GaN epilayers was probed, indicating different patterns of energy dissipation for both. On the other hand, hot electron relaxation in n-type GaN was shown to be dominated by longitudinal optical (LO)-phonon emission with relaxation time as small as 0.1 ps, which highlight the role of the nonequilibrium statistical mechanics for the description of the carriers dynamics in GaN. In this work, we consider the behavior of the absorption coefficient a(w) and luminescence spectrum I(w) in the steady state when III-nitrides (compounds GaN, AIN and InN) are in far-from-equilibrium conditions created by an electric field. Particularly, we analize the higher frequencies part of their spectrum and derive a generalization of the Roosbroecke-Shockley relation DRS(w,e), the reason between the frequency dependent luminescence spectrum and absorption coefficient, for nonequilibrium conditions which are dependent of the electric field intensity e. We show that the carrier´s temperature within a small error is proportional to |d{ln DRS(w,e)}/dw|. In conclusion, we can say that optical experiments allow for the characterization of the nonequilibrium macroscopic state of doped III-Nitrides, in the condition of being driven away from equilibrium by the action of electric fields.

In: MRS-2000 Fall Materials Research Society Meeting, 2000, Boston, MA, USA. Proceedings of 2000 Fall Materials Research Society Meeting, de 27 de novembro a 01 de dezembro de 2000, Boston-USA.

PUBLISHED PAPERS

[P001-00] "Reversible scaling: Optimized free-energy determination using atomistic simulation techniques."

De Koning, M., Antonelli, A., and Yip, S.

We present a new simulation technique that allows accurate and very efficient-determination of free energies as a function of temperature using a single constant temperature molecular dynamics or Monte Carlo simulation. The method is based on the dynamical reversible scaling of the potential energy function of the system of interest and is implemented using the adiabatic switching method. Application to the calculation of the free energy of crystalline silicon using a semi-empirical interatomic potential demonstrates that the reversible-scaling method provides an accurate and very efficient tool for the calculation of free energies over a wide temperature interval.

Journal of Computer-Aided Materials Design 6 (2-3), 349-353, 1999

[P002-00] "Exciton states and diamagnetic shifts in symmetric coupled double GaAs-Gal(1-x)Al(x)As quantum wells within the fractional-dimensional approach."

Matos-Abiague, A., Oliveira, L. E., and Dios-Leyva, M.

We have extended the fractional-dimensional space approach to study exciton states and diamagnetic shifts in symmetric coupled double GaAs-Ga1-xAlxAs quantum wells. In this scheme, the fractional dimension is chosen using an analytical procedure, and the real anisotropic 'exciton + double quantum well' semiconductor system is mapped, for each exciton state, into an effective fractional-dimensional isotropic environment. We have peformed calculations within the fractional-dimensional space scheme for the binding energies of Is-like heavy-hole direct excitons and for the energy difference between 1s- and 2s-like direct heavy-hole exciton states in GaAs-Ga1-xAlxAs symmetric coupled double quantum wells. Also, theoretical results were obtained for the magnetic-field dependence of the Is-like heavy-hole exciton energy shift and for the exciton diamagnetic coefficient in quantum wells and symmetric coupled double quantum wells. Fractional-dimensional theoretical results are shown to be in good agreement with available experimental measurements and previous theoretical calculations

Journal of Physics-Condensed Matter 12[26], 5691-5700. 2000.

[P003-00] "Mobility of Bloch walls via the collective coordinate method."

Desposito, M. A., Ferrer, A. V., Caldeira, A. O., and Neto, A. H. C.

We have studied the problem of the dissipative motion of Bloch walls considering a totally anisotropic one-dimensional spin chain in the presence of a magnetic field. Using the so-called "collective coordinate method" we construct an effective Hamiltonian for the Bloch wall coupled to the magnetic excitations of the system. It allows us to analyze the Brownian motion of the wail in terms of the reflection coefficient of the effective potential felt by the excitations due to the existence of the wall. We find that for finite values of the external field the wall mobility is also finite. The spectrum of the potential at large fields is investigated and the dependence of the damping constant on temperature is evaluated. As a result we find the temperature and magnetic-field dependence of the wall mobility.

Physical Review B 62[2], 919-927. 2000.

[P004-00] "Excitonic absorption in a quantum dot."

Hawrylak, P., Narvaez, G. A., Bayer, M., and Forchel, A.

The excitonic absorption spectrum of a single quantum dot is investigated theoretically and experimentally. The spectrum is determined by an interacting electron-valence-hole complex. We show that the mixing of quantum configurations by two-body interactions leads to distinct absorption spectra controlled by the number of confined electronic shells. The theoretical results are compared with results of photoluminescence excitation spectroscopy on a series of

single self-assembled In0.60Ga0.40As quantum dots.

Physical Review Letters 85[2], 389-392. 2000.

Abstracta

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