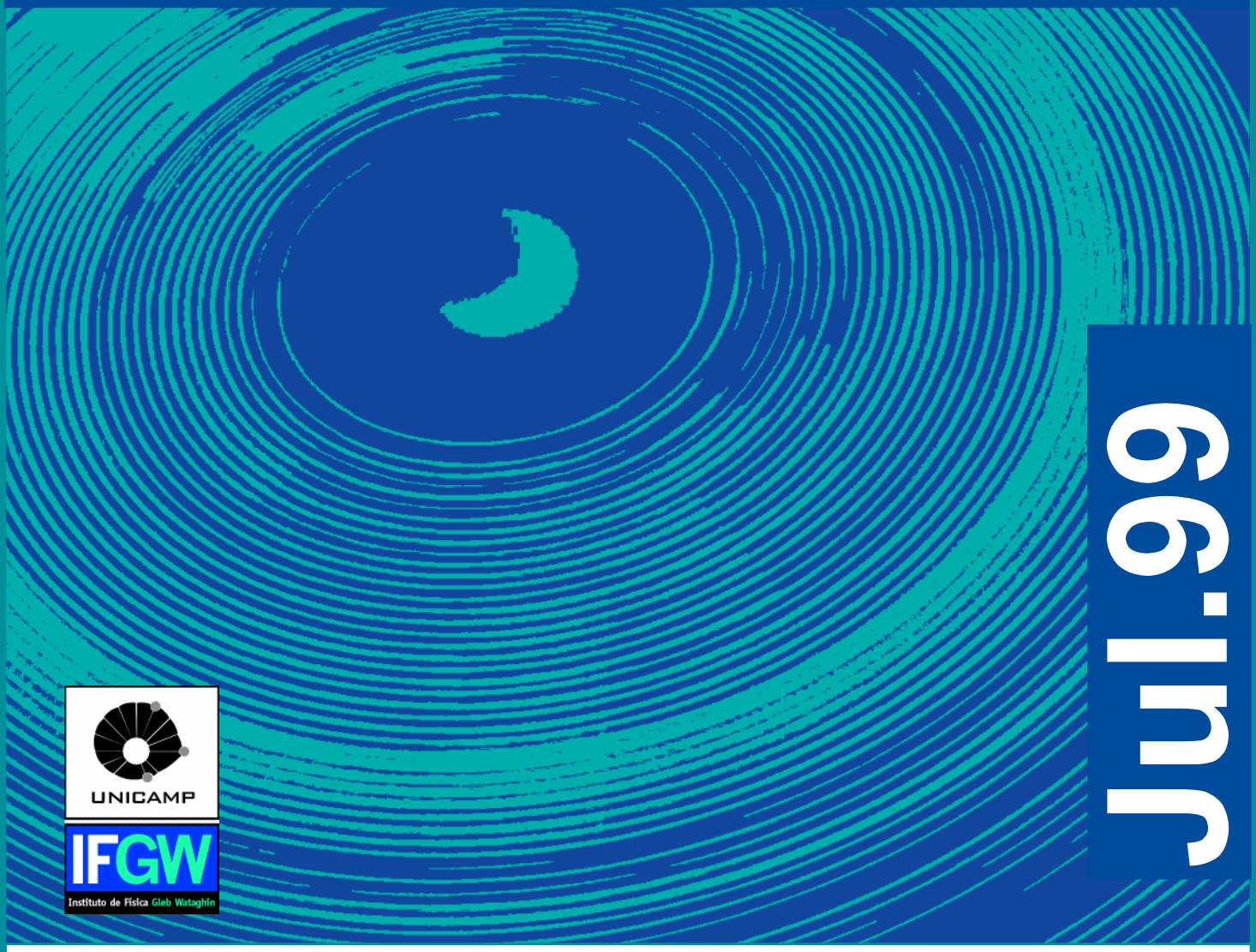
Abstracta

Ano III - N. 06



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Trabalhos Aceitos para Publicação

A033-99 à A038-99

Trabalhos Aceitos para Apresentação em Conferências

C002-99 à C003-99

Accepted papers

[A033-99] "Effects of Ar-ion Implantation and Thermal Treatment on Magnetic Properties of Co/Pd Multilayers: a ferromanetic resonance study."

J. A. Romano, E. C. da Silva, L. F. Schelp, J. E. Schmidt, R. Meckenstodk, J. Pelzl.

The volume and surface anisotropies of Co/Pd multilayers have been studied by ferromagnetic resonance (FMR) and vibrating sample magnetometer (VSM) measurements for different layer thicknesses and as function of thermal treatment and before and after ion implantation. A second resonance mode was observed for some samples depending on the layer thicknesses. Exposing the samples to a thermal treatment and to Ar+-ion-implantation the observed changes of the effective anisotropy field are consistent to the idea that both processes cause a deterioration of the ML structure. No significant differences in the FMR magnetic parameters are found if the MLs are grown either on glass or on Si(111) substrates apart from a change of the line width due to changes in texture homogeneity.

Journal of Magnetism and Magnetic Materials 205 (2-3), 161-169, 1999

[A034-99] "Nonlinear-Driven Instability of Dynamical Plasma in Solids: emergence of spatially self-organized order and chaotic-like behavior."

Sergio A. Hassan, A. R. Vasconcellos and R. Luzzi

We analize in detail the nonlinear kinetics of a carrier system in a photoinjected plasma in semiconductors under the action of constant illumination with ultraviolet light. We show that the spatially homogeneous steady-state becomes unstable, and a charge density wave emerges after a critical intensity of the incident radiation is achieved. It is shown that this instability can only follow in doped p-type materials. In bulk systems the critical intensity was found to be too high making the phenomenon not observable under realistic experimental conditions. However, quite efficient electron excitation of low dimensional p-type systems, like some molecular and biological polymers, can be obtained by chemical interaction with the medium. This alternative excitation mechanism could allow the instability to be observed at lower radiation levels. We show that for intensities beyond the critical threshold an increasing number of modes provide further contributions (subharmonics) to the space inhomogeneity. It is conjectured that this process could lead the system to display chaotic-like behavior.

European Physics Journal B 13 (1), 131-139, 1999

[A035-99] "Angular Dependence of Giant Magnetoimpedance in an Amorphous CoFeSiB Ribbon."

K. R. Pirota, L. Kraus, M. Knobel, P. G. Pagliuso, C. Rettori.

The field response of impedance is studied in a stress-annealed amorphous ribbon as a function of the angle of application of the external magnetic field, in order to verify the role of induced anisotropies (and their distribution) and demagnetizing factors in the giant magnetoimpedance (GMI) phenomenon which occurs in soft magnetic materials. The experimental results are well explained by a theoretical model, based on the simultaneous solution of Maxwell equations and the Landau-Lifshitz equation of motion. Demagnetizing effects are properly taken into account in the case of ribbons or thin films. The physical parameters necessary to test the theory were obtained through complementary measurements of ferromagnetic resonance and temperature dependence of magnetization. The results clearly indicate the enormous influence of the distribution of anisotropies on the GMI effect. Also, an experimental procedure for determining the easy axis distribution function is proposed.

Physical Review B 60 (9), 6685-6691, 1999

[A036-99] "Influence of Induced Anisotropy and Magnetostriction on the Giant Magnetoimpedance Effect and its Aftereffect in Solft Magnetic Amorphous Ribbons."

K. R. Pirota, M. L. Sartorelli, M. Knobel, J. Gutierrez and J. M. Barandiarán.

Systematic measurements of giant magnetoimpedance (GMI) and its relaxation (magnetoimpedance aftereffect, MIAE) have been carried out on a series of Co-rich amorphous ribbons with different magnetostriction constant, before and after the induction of transverse anisotropy through stress-annealing. Interesting characteristics of the GMI effect as a function of driving current (circular field) amplitude and frequency were observed. The applied thermal treatment produced a shift in the magnetostriction values, as well as a strong magnetic anisotropy perpendicular to the ribbons axis. The behaviour of GMI changes drastically upon stress-annealing, all samples displaying an hysteretic behaviour and a well defined peak structure. However, the magnitude of the effect is not substantially affected by the thermal treatment. On the other hand, a strong suppression of the impedance relaxation (aftereffect) is verified after the annealing procedure. Besides the obvious technical implications, the experimental data are used to discuss on the possible physical origin of the magnetoimpedance aftereffect.

Journal of Magnetism and Magnetic Materials 202 (2-3), 431-444, 1999

[A037-99] "Nonlinear Relaxation in Nonequilibrium Oscillators: Bose-Einstein-like condensation in a dissipative structure."

J. A. Madureira, L. Lauck, A. R. Vasconcellos and R. Luzzi.

We consider a system of externally pumped nonequilibrium harmonic oscillators (vibrational modes) interacting through anharmonic effects with a system of harmonic oscillators with lower-lying frequencies (acoustic-like vibrations) composing a thermal bath for the former. We derive the equations of evolution for the population of the vibrational modes, introducing high order nonlinear relaxation processes. It is shown that complex behavior arises in this system, namely, after a certain critical intensity of the pumping source is achieved, the populations of the modes lowest in frequency increase enormously at the expenses of the excitations of the other modes. In this way there follows what can be termed a Bose-Einstein-like condensation, not in a phase in equilibrium, but in a nonequilibrium dissipative structure.

Chaos, Solitons and Fractals 11 (8), 1219-1230, 2000

[A038-99] "The Scope for Generating Bio-oils with Relatively low Oxygen Contents via Hydropyrolysis."

J. Dilcio Rocha, C. A. Luengo and C. E. Snape.

The primary oils obtained in high yields from fast (fluidised-bed) pyrolysis of biomass generally have high oxygen contents (ca. 40% w/w). The scope for using pyrolysis under hydrogen pressure (hydropyrolysis) can give rise to higher oil yields with much lower oxygen contents compared to normal pyrolysis has been investigated. Fixed-bed hydropyrolysis tests have been conducted on cellulose, sugar cane bagasse and eucalyptus wood using hydrogen pressures up to 10 MPa, with heating rates of 5 and 3000C min-1. A colloidal FeS catayst was used in some tests (Fe loading of 5%,w/w) to increase overall conversions. Further, the attractive option of using a two-stage reactor in which the primary oil vapours are passed though a bed of hydrotreating catalyst is also described. Raising the hydrogen pressure from atmospheric to 10 MPa increased the carbon conversion by ca. 10 mole % which was roughly equally divided between the oil and hydrocarbon gases with a concomitant reduction in the

oxygen content of the primary oil by over 10% to below 20% w/w. The addition of a dispersed iron sulphide catalyst gave conversions close to 100% at 10 MPa and reduced the oxygen content of the oil by a further 10%. The effect of hydrogen pressure on oil yields was most pronounced at low flow rates where it is beneficial in helping to overcome diffusional resistances. Although NMR indicated that the oils became increasing more aromatic as more oxygen was removed, the increase in hydrogen pressure decreased the extent of overall aromatisation that occurs due to the higher gas and lower char yields obtained. In two-stage tests for cellulose using a commercial sulphided Ni/Mo g -Al2O3 catalyst at 4000C, increasing the hydrogen pressure from 2.5 to 10 MPa decreased the oxygen conten of the oil by over 20% to 10% w/w. The H/C ratios were higher and O/C ratios smaller for the two-stage oil compared to their single stage counterparts. However, the differences in the O/C ratios between the single and two-stage bio-oils increase with pressure.

Organic Geochemitry 30 (12), 1527-1534, 1999

Accepted papers for conferene presentation

[C002-99] "Hot Electron Dynamics in Zincblende and Wurtzite GaN."

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

Promising technological applications of III-V nitride semiconductors are inducing considerable effort for the understanding of their basid properties. However, photoexcited GaN excess carrier relaxation is one important subject that only recently is receiving attention, despite the importance of ghe knowledge on how carrier thermalization occurs for better device development. In particular, it is necessary to have information on the carrier dynamics in both wurtzite and zincblende GaN phases since the former presents many advantages related to the growth process, while the later offers higher saturated electron drift velocity and lower band energy, which is important for device performance . An investigation of the excess energy dissipation of photoexcited electrons in both GaN wurtzite and zincblende is presented in this work. The calculations are performed by solving numerically coupled quantum transport equations for the carriers temperature (after Coulomb thermalization) and the acoustic, transversal and longitudinal optical phonons temperatures to have a picture of their excess energy dissipation. It is shown that the electron energy dissipation is always faster in GaN wurtzite than in zincblende, but both occurs in a sub-picosecond scale (< 0.2 ps). Although at the beginnig of the cooling process the LO-phonon temperature in GaN zincblende is a higher than in GaN wurtzite, the LO-phonons in GaN zinclende thermalize faster with the crystal lattice due to their stronger energy dissipation rate to the acoustical phonons bath.

Third International Conference on Nitride Semiconductors, Montpelier, França- julho 1999, accepted on june 1999.

Physica Status Solidi B Basic Research 216 (1), 35-39, 1999

[C003-99] "Subpicosend Overshoot Effects in III-Nitrides."

C. G. Rodrigues, E. F. da Silva Jr., V. N. Freire, A. R. Vasconcellos and R. Luzzi.

Wide-band-gap nitride based semiconductors (GaN, AlN, InN and their alloys) are attracting considerable attention due to their promising applications in electronic and optoelectronic, particularly for blue light emission devices. However, there is still a lack of information concerning some of their fundamental bulk properties. As a matter of fact, high-field transport investigations recently performed addressed mainly steady-state phenomena despite ultrafast transport phenomena in III-nitrides to be relevant for future technological applications in the submicron conductor channels domain. Only in the last two years were published initial results concerning the time response of electrons in GaN subjected to high electric fields. The purpose of this work is to present the first comparative study on the subpicosecond high-field tranport transient properties of electrons in GaN, AlN, and InN subjected to electric fields F. up to 120 up kV/cm. Overshoot effects are shown to occur in the carrier drift velocity and temperature, as well as in the LO-phonon temperature in less the 0.5 ps for high enough electric fields, being stronger in InN in GaN and AlN.

In: Proceedings of International Conference on Solid State Devices and Materials, 1999, Osaka, Japan, set 1999

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Abstracta

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