

Abstracta

Ano II - N. 06

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Trabalhos Aceitos para Publicação

A040-98 à A044-98

Trabalho Aceito em Congresso

C012-98 à C018-98

A 040-98 Minimum Temperature in Electromagnetic Levitation Melting under Terrestrial Gravity.

Clemente, R.

Recently, the existence of minima for the dissipated power in electromagnetic levitation melting has been reported. Such results will be used in order to estimate the temperature of the surface of the sample, when the only allowed mechanism for energy transport from the levitated drop is radiation cooling. It is also possible to estimate the difference in temperature, between the bulk and the surface of the specimen, when the principal mechanism for energy transport inside the liquid metal is thermal conductivity. The results suggest that even in experiments under terrestrial gravity, it should be possible to reach large undercooling for some metals of high melting point, high total hemispherical emissivity, relatively low resistivity and density, without any need for a cooling gas atmosphere.

Journal of Applied Physics 84 (5), 2968-2970, Mai 1998

A 041-98 Quantum State Engineering via Unitary Transformations.

Vidiella-Barranco, A. and Roversi, J. A.

We construct a Hamiltonian for the generation of arbitrary pure states of the quantized electromagnetic field. The proposition is based upon the fact that a unitary transformation for the generation of number states has been already found. The general unitary transformation here obtained, would allow the use of nonlinear interactions for the production of pure states. We discuss the applicability of this method by giving an example of generation of simple superposition states. We also compare our Hamiltonian with the one resulting from the interaction of trapped ions with two laser fields.

Physical Review A 58 (4), 3349-3352, 1998

A 042-98 High-Resolution LMN and LMM Auger Spectra of Pd, Ag, In Sn and Sb.

Landers, R., de Castro S. G. C., de Siervo, A., Kleiman, G. G.

Considerable interest in high-resolution Auger spectroscopy of the 4d metals has arisen because of the possibility of treating Auger spectroscopy as an excited state probe in order to extract new information regarding electronic structure. Auger transitions involving only core levels are interesting because current theories of line shapes and energies usually assume that the final core holes are either atomic or quasi-atomic. Comparison of the results of atomic calculations with experimental Auger spectra comprises a crucial test of the atomic theories. We present the results of high-resolution measurements of several high energy LMN and LMM Auger spectra of Pd, Ag, In, Sn and Sb excited with Ti K α radiation. Assignments of the peaks are based upon energy and intensity considerations. We compare the experimental spectra with the results of atomic transition probability calculations, which indicates the reliability of such calculations as we proceed from open to closed 4d shell metals.

Journal of Electron Spectroscopy and Related Phenomena 94 (3), 253-257, Jul 1998

A 043-98 Transitions Between Excited Electronic States of H₂ Molecule by Electron Impact.

Sartori, C. S., da Paixão, F. J., Lima, M. A. P.

We present theoretical integral and differential cross sections for transitions produced by electron collision with and excited H₂ molecule (C³Pi_u and A³Sigma_g⁺) obtained with the Schwinger Multichannel method in a 4-state approximation. We also present the transition rates obtained with these cross sections. The results indicate the importance of these

scattering processes in modeling H₂ discharge.

Physical Review A 58 (4), 2857-2863, 1998

A 044-98 Second Magnetization Peak at low Fields due to Thermomagnetic Flux-Jump Instability.

Kopelevich, Y. and Esquinazi, P.

Magnetization measurements performed on a Nb thin films have revealed the existence of a "second magnetization peak" (SMP) well below the upper critical field boundary H_{c2}(t). The results of this work provide clear evidence that the SMP originates from a thermomagnetic flux-jump instability. The similarity of the magnetization loops measured in Bi₂Sr₂CaCu₂O₈ high-T_c superconducting crystals to those in Nb, as well as their dependence on the crystal size and field step indicate that a common mechanism is responsible for the SMP in these superconductors.

Journal of Low Temperature Physics 113 (1-2), 1-9, 1998

ACCEPTED PAPERS FOR CONFERENCE PRESENTATION

C 012-98 Electrochromism in MoO_x films characterized by x-ray electron spectroscopy.

Cruz, T. G. S., Gorenstein, A., de Castro, S. C., Landers, R. and Kleiman, G. G.

The ability of molybdenum oxide thin films to reversibly exchange lithium ions (with an electrolyte) and electrons (with an external circuit) has been explored in optical electrochromic device. The as-grown films are either transparent or slightly blue and show a deep blue color upon Li⁺ insertion. The thin film electronic band and crystallographic structure govern the kinetics of insertion reaction and the charge capacity of the material, as well as the optical behaviour of the system. In this work molybdenum thin films were produced by reactive sputtering of a metallic molybdenum target in an O₂ - Ar atmosphere. Thin films with distinct compositions, were obtained by varying the oxygen flow during deposition and maintaining all the other deposition parameters constant. Lithium intercalation was promoted by electrochemical means, from an aprotic, Li⁺ containing electrolyte.

12th International Conference on Vacuum Ultraviolet Radiation Physics - (VUV) - 03 a 07 August 1998, San Francisco - USA, accepted on June 1998.

C 013-98 LMM and LMN Auger Transitions of 4d Metals: Comparison of Experiment and Theory.

De Siervo, A., Landers R., de Castro S. G. C., Morais, J. and Kleiman, G. G.

The X-ray excited Auger Electron Spectroscopy (XAES) is fundamentally a spectroscopy of excited states whereas X-Ray Photoelectron Spectroscopy (XPS) is basically a spectroscopy of the ground state. In the recent years, there has been considerable theoretical and experimental interest in the study of Auger transitions, with regard, for example to hole-hole interactions, electron correlation effects, screening processes, etc. Auger transitions involving only core levels, are particularly interesting because the quasi-atomic model of screening is strictly applicable here. In this limit, theoretical models are applicable to the calculation of energy and line shape, and comparisons with experimental results are a crucial test of atomic theories. Here we present the measurements results of the LMM and LMN Auger spectra in Nb, Mo, Ru, Th, Pd, Ag, In Sn and Sb, excited with the K α radiation of a Ti anode.

12th International Conference on Vacuum Ultraviolet Radiation Physics - (VUV) - 03 a 07 August 1998, San Francisco - USA, accepted on June 1998.

C 014-98 Line Shape Variations of Auger Shake-up Satellites of Ag Outside the Resonance Regime.

Morais, J., Landers, R., de Siervo, A., Abbate, M., de Castro, S. G. C., Kleiman, G. G.

Understanding metallic response to the presence of a dynamic, localized perturbation, such as a finite lifetime core hole, has been the theme of many studies. In XPS of d-band metals, such as Ni and Pd, such effects as shake-up satellites are common. In Auger spectroscopy, however, the most intensively studied metal, Cu, manifest LVV satellites associated with Coster-Kronig (CK) transitions. Unambiguously identified shake-up satellites have been observed in the L123M45M45 spectra of the 4d metals, studied with conventional X-ray sources and, in the L3 threshold region, with Synchrotron radiation. There remain questions concerning the origin of these satellites and their relation to the corresponding XPS spectra.

12th International Conference on Vacuum Ultraviolet Radiation Physics - (VUV) - 03 a 07 August 1998, San Francisco - USA, accepted on June 1998.

C 015-98 Photon Energy and core Hole Lifetime Dependences of Ag High Energy Auger Satellites.

Morais, J., de Siervo A., Landers, R. , de Castro S. G. C. and Kleiman, G. G.

Understanding metallic response to the presence of a dynamic, localized perturbation, such as a finite lifetime core hole, has been the theme of many studies. Although, in XPS of d-band metals, such as Ni and Pd, such effects as shake-up satellites are common, in Auger spectroscopy, an intrinsic laboratory of many-body effects, the most intensively studied metal, Cu, manifest LVV satellites which are associated with Coster-Kronig (CK) transitions. Unambiguously identified shake-up satellites have been observed in the $L_{123}M_{45}M_{45}$ spectra of the 4d metals, studied with conventional X-ray sources [1] and, in the L_{3} threshold region, with Synchrotron radiation [2]. There remain questions concerning the origin of these satellites and their relation to the corresponding XPS spectra. Here, we report a study of the $Ag L_{123}M_{45}M_{45}$ spectra as a function of photon energy and demonstrate the evolution of the satellite spectra. The experiments were performed using the SXS-beamline at the National Synchrotron Laboratory of Brazil (LNLS). The change of the satellite shapes with photon energy is directly related to the validity of the sudden approximation. Correlation of the satellite spectra with core level lifetime indicates the influence of core hole dynamics. From experimental systematics, it becomes clear that isolation of CK effects [3] is very difficult.

14th International Vacuum Congress (IVC-14) and 10th International Conference on Solid Surfaces (ICSS-10), 31/08 a 04 September 1998, Birmingham- Inglaterra, accepted on June 1998.

C 016-98 Transition from Single Impurity to Kondo Lattice Regime in $(La_{1-x}Ce_x)Pd_2Al_3$.

Medina, A. N., Rojas, D. P. , Gandra, F. G. , Azanha, W. R. and Cardoso, L. P.

$CePd_2Al_3$ is a well known material with $T_N=2.7K$ and Kondo temperature $T_K=19K$. Although the application of external pressure in this system was already investigated the dilution of the magnetic ion with La was not yet studied. It is known that the dilution process is equivalent to the application of a negative pressure causing the lattice volume to increase, thus leading to changes in the RKKY and Kondo effect competition. In this study we present measurements of specific heat and resistivity for the series of compounds $(La_{1-x}Ce_x)Pd_2Al_3$, for $0 \leq x \leq 1$. The resistivity results show a transition from the single impurity to a Kondo lattice regime for $x \gg 0.6$. The magnetic specific heat shows a broad peak centered at 14K that is the result of the Kondo and crystal field (CF) contributions. The calculation shows a small decrease of T_K down to 13K at $x=0.2$ and an essentially constant CF splitting $D_1 \sim 35K$ ($D_2 > 800K$). From the unit cell volume dependence of T_K we estimated $|J_n(eF)| = 0.30$ for $x = 1$ and $|J_n(eF)| = 0.27$ for $x=0.2$. The antiferromagnetic ordering was not observed for $x < 0.8$. This

accentuated variation of TN is discussed in terms of a structural ordering and the reduction of $|J_n(eF)|$.

International Conference on Strongly Correlated Electron Systems - SCES 98 , 15-18 July 1998, accepted on June 1998.

C 017-98 Determination of the transition from Kondo to Intermediate Valence Regime in $(La_{1-x}Ce_x)Ni$ Using ESR.

Medina, A. N. , Gandra, F. G. , Azanha, W. R. and Cardoso, L. P.

We report on Electron Spin Resonance (ESR) results obtained in $(La_{1-x}Ce_x)Ni$ doped with Gd. It is well known that this series of compounds presents a transition from Kondo single impurity to intermediate valence regime around $x \sim 0.6$. The ESR results for the Gd g-value and linewidth as function of the concentration shows a clear change in its behavior as concentration is varied around x_C . The g-value increase linearly with concentration for $x < x_C$ turning to a negative slope for $x > x_C$ while the linewidth presents a discontinuity for $x \sim x_C$. The ESR results were analyzed considering the RKKY interaction between the Ce and Gd ions and using this calculations we estimated the Ce-Gd exchange parameter $J_{Ce-Gd} = 4.8$ meV and the Ce -conduction electrons exchange parameter $|J_f-s| = 19$ meV, for $x=1$.

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C 018-98 Electrical Resistivity and Specific Heat of $La_{1-x}Yb_xCu_3Al_2$.

Rojas, D. P., Medina, A. N. , Gandra, F. G., Azanha, W. R. and Cardoso, L. P.

Electrical resistivity (r) and specific heat (c) were measured for the series of compounds $La_{1-x}Yb_xCu_3Al_2$ ($0 \leq x \leq 1$). The x-ray results show that the unit cell volume decreases as the Yb concentration increases. The resistivity results present a superconductor transition at 1.7 K for the $LaCu_3Al_2$ compound as well as an accentuated minimum at T_m for the high Yb concentration samples. For $T < T_m$, r depends on $-\ln T$, a characteristic of the Kondo effect. From the specific heat data we determined the crystal field parameters to be essentially constant $D_1 \gg D_2 \gg 100K$ ($\pm 20K$) while, qD varies from 280K to 310 K (± 10 K) when x goes from 0 up to 1. T_K was determined using the data below 10 K and it was found to increase with the concentration. This behavior suggests the increase of the $|J_n(eF)|$ due to the volume contraction. The Sommerfeld coefficient measured for the reference sample ($x=0$), $\gamma = 4$ mJ/molK², is characteristic of metallic compounds. This value increases up to a maximum $\gamma = 122$ mJ/molK² for $x=0.8$ and decreases down to $\gamma = 53$ mJ/molK² for $x=1$. This behavior is explained considering the variation of T_K and the internal field of the samples as function of the Ce concentration.

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