Physics
P1. Evolution of the Time-Lag and Variability Luminosity Relations for Long Gamma-Ray Bursts

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37th COSPAR Scientific Assembly. Held 13-20 July 2008, in Montreal, Canada., p.151

Abstract
Several luminosity relations currently exist for long gamma-ray bursts. Some were derived from the light curves; others were obtained from the spectra. In this study, we consider two of these luminosity relations: the time-lag, \( i \), relation and the variability, \( V \), relation and investigate their possible dependence on (or “evolution” with) the redshift. The data we use are taken from Schaefer’s (2007) analysis of 69 long gamma-ray bursts. The method consists of binning the data by redshift, \( z \), then writing the time-lag relation in the form \( \log(L) = A + B \log[T/(1 + z)] \) and extracting the fit parameters \( A \) and \( B \) for each redshift bin; likewise, for the variability relation, which we write in the form \( \log(L) = A + B \log[V(1 + z)] \). The objective is then to see whether the fitting parameters \( A \) and \( B \) evolve in any systematic way with the redshift. Our preliminary analysis indicates that the \( B \) parameter does indeed evolve with \( z \) in a systematic way, while the \( A \) parameter shows a weak dependence on \( z \). Throughout the analysis a flat universe with \( \Omega_M = 0.3 \) and \( H_0 = 70 \) km/s.Mpc is assumed.

P2. The Missing Host Galaxies of (some)Gamma-Ray Bursts

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37th COSPAR Scientific Assembly. Held 13-20 July 2008, in Montreal, Canada., p.II 04

Abstract
The detection of Gamma-Ray Bursts (GRBs) has increased by at least an order of magnitude with the launch of Swift. On the other hand, the number of host galaxies observed for GRBs has remained limited; moreover, the observed host galaxies do not seem to be correlated with redshift (distance). A recent (Ovaldsen et al. 2007) search on 24 GRBs with the Danish 1.54 m telescope at ESO/La Silla did not detect host galaxies for more than half of the sample. More baffling, though, was the case of GRB 070125, for which no galaxy was found even after a search with the 10 meter Keck I
telescope. We here consider possible explanations for these observations. We have tabulated relevant data (fluence, redshift, extinction coefficients, etc.) of all GRBs for which such information could be found, and we have undertaken a statistical analysis in order to determine the probability that there is some systematic effect on some properties of the GRBs or the galactic environments that may explain the absence of host galaxies in various cases/searches. We report our preliminary results and analysis including: distance effect, extinction, intrinsic burst properties and other related parameters.

P3. The dc and ac Properties of Potassium Trioxalatoferrate (III) Trihydrate

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Current Applied Physics, 8, 134-137, 2008

Abstract
The complex potassium trioxalatoferrate (III) trihydrate \{K\textsubscript{3}Fe(C\textsubscript{2}O\textsubscript{4})\textsubscript{3}.3H\textsubscript{2}O\} was synthesised and characterised by energy dispersion X-ray fluorescence (XRF) and X-ray diffraction (XRD). The electrical and dielectric properties of the complex pellet were studied by ac- and dc-techniques in room temperature and in a temperature range of 293-373 K. The data of the ac conductivity as a function of frequency in a frequency range of 1-100 kHz follow the correlated barrier hopping CBH model and the parameters of the model were determined and connecting them with the optical properties. The temperature dependence of dc conductivity shows that the semi-conducting behavior of conduction phenomenon in the complex is realised by hopping mechanism between localised states and the minimum hopping distance was determined. High relative permittivity of about 30 at 100 kHz was obtained for the complex, which can find technological applications like alternative for the SiO\textsubscript{2} insulator in MOS devices.

P4. Correlated Structural and Optical Study of Zn-Mn-O System Thin Films

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Materials Chemistry and Physics, 107, 518-523, 2008
Abstract
Zinc-manganese oxide thin films prepared on glass and Si substrates have been annealed at different conditions in order to create different crystalline structures and agitate a solid-state reaction. The films were characterised by energy dispersion X-ray fluorescence (EDXRF), X-ray diffraction (XRD), and UV-vis absorption spectroscopy. The EDXRF spectrum was used to determine the weight fraction ratio of Mn/Zn in the prepared samples. The XRD method was used to determine the crystalline structure of the phases created in the sample during the pre-annealing processes at different temperatures (400, 600, 800, and 1000 °C) in air and in vacuum. The spectral transmittance and reflectance of amorphous and polycrystalline Zn-Mn oxide samples grown on glass substrates in the fundamental absorption region of the spectrum were studied. The spectral refractive index as well as extinction coefficient was determined. The optical bandgap and its variation under crystallisation were determined. The spectral real and imaginary parts of the optical dielectric constant were calculated and explained by a molecular energy diagram.

P5. dc-Conduction Mechanism in Lanthanum-Manganese Oxide Films Grown on p-Si substrate

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Microelectronics Reliability, 48, 395-400, 2008

Abstract
Thin films of (La-Mn) double oxide were prepared on p-Si substrates for electrical investigations. The samples have been characterised by X-ray fluorescence (XRF) and X-ray diffraction (XRD) methods. The XRF spectrum was used to determine the weight fraction ratio of Mn to La in the prepared samples. The XRD study shows the formation of grains of LaMnO₃ compound through a solid-state reaction for annealing at 800°C. Samples used to study the electrical characteristics of the prepared films were constructed in form of a metal-oxide-Si MOS structures. Those MOS structures were characterised by the measuring their capacitance as a function of gate voltage $C(V_g)$ in order to determine the oxide charge density $Q_{ox}$, the surface density of states $D_s$ at the oxide/Si interface, and to extract the oxide voltage in terms of gate voltage. The extracted dielectric constant of the double oxide film is lower than that of pure La₂O₃ film and larger than that of pure Mn₂O₃ film, but the formation of LaMnO₃ grains by a solid-state reaction at 800°C increases the relative permittivity to 11.5. These experimental
conclusions might be useful to be used in the field of Si-oxide alternative technique. The leakage dc current density vs. oxide field $J(E_{\text{ox}})$ relationship for crystalline films follow the mechanism of Richardson-Schottky (RS), from which the field-lowering coefficient and the dynamic relative permittivity were determined. Nevertheless, the leakage current density measured in a temperature range of (293-363 K) was not controlled by the RS mechanism. It was observed that the temperature dependence of the leakage current in crystalline (La-Mn) oxide insulating films has metallic-like temperature behavior, which might be important in the technical applications.

**P6. Structural and Electrical Properties of Zn Doped Mn Oxide Thin Films Grown on p-Si substrates**

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*Journal of Alloys and Compounds, 454, 24-30, 2008*

**Abstract**

In the present work, Zn-Mn oxide thin films were prepared on p-Si(1 0 0) substrates for structural and electrical studies. The X-ray fluorescence (XRF) technique was used to determine the relative weight fraction ratio of Mn/Zn in the prepared samples. The X-ray diffraction (XRD) study shows that films annealed at 400 °C have amorphous structure and they were crystallised under pre-annealing at 600 °C or more. Moreover, Zn oxide cannot crystallise alone, but instead it diffuses into Mn oxide grains. A comprehensive study on electrical properties was carried on. The ac-conductance and capacitance as a function of gate voltage, frequency, and temperature were studied on samples made in form of metal/oxide film/Si MOS devices. The fixed charge and interface state densities were determined and their variation with annealing process was studied and explained. It was found that the "correlated barrier hopping" CBH model controls the frequency dependence of the conductivity, while Kramers-Kronig (KK) relations explain the frequency dependence of the relative permittivity. The parameters of CBH model were determined showing that the ac-conduction is realised by single-polaron hopping mechanism. dc-Conduction properties were also studied through the voltage and temperature dependence of the leakage dc-current density. The obtained dc-data follow a Richardson-Schottky (RS) mechanism.
P7. Charge Trapping and ac-electrical Conduction in Nanocrystalline Erbium Manganate Film on Si substrate

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Abstract
Thin film of nanocrystalline ErMnO₃ was prepared by thermal annealing of Er-Mn oxide film deposited on p-Si(100) substrates. The X-ray fluorescence (XRF) and X-ray diffraction (XRD) technique were used to investigate the structure of the prepared Er-Mn oxide films. XRD study shows that films pre-annealed at 400 °C have amorphous structure and they were crystallised forming ErMnO₃ compound under pre-annealing at 800 °C or more. Moreover, in the prepared Er-Mn oxide films, Er oxide or Mn oxide cannot be crystallised each alone, but instead they interact chemically with each other forming ErMnO₃ compound. A comprehensive study on electrical properties was carried on. The ac-conductance and capacitance as a function of gate voltage, frequency, and temperature were studied on samples made in form of metal/oxide film/Si MOS devices. The fixed charge and interface state densities were determined and their variation with annealing process was studied and explained. It was found that the “correlated barrier hopping” CBH model controls the frequency dependence of the ac-conductivity, while Kramers-Kronig (KK) relations explain the frequency dependence of the relative permittivity. The parameters of CBH model were determined showing that the ac-conduction is realised by bipolaron hopping mechanism. dc conduction properties were also studied through the voltage and temperature dependence of the leakage dc-current density. The obtained dc-data follow a space charge limited current (SCLC) mechanism.

P8. Correlated Transport and Optical Phenomena in Ga-doped CdO Films

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Solar Energy, 82, 513-519, 2008
Abstract
Series of samples of lightly Ga-doped CdO thin films (3%, 6%, and 9%) have been prepared by evaporation method on glass substrate. The prepared films were characterized by X-ray diffraction (XRD), UV-VIS-NIR absorption spectroscopy, and dc-electrical measurements. The investigation shows that Ga doping widens the energy gap of CdO. The optical properties were easily explained by using Tauc et al. band-to-band transitions and classical Drude theory. The electrical behavior of the samples shows that they are degenerate semi-conductors. The 6% Ga-doped CdO sample shows increase its mobility by 3.2 times, increase its conductivity by 1.5 times, increase its intrinsic bandgap, and a slight increase its transmittance relative to undoped CdO film. Explanation was given concerning these variations. From transparent conducting oxide (TCO) point of view, Ga is not sufficiently effective for CdO doping comparing to other dopants like In, Sn, Sc, and Y.


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Abstract
The electrical and optical properties of CdO films post-annealed in hydrogen atmosphere for different durations (15 min, 30 min and 60 min) were studied. The prepared films were subjected to structural characterization by the x-ray diffraction method and optical characterization by the UV-VIS-NIR absorption spectroscopy method. Experimental data indicate that annealing in H₂-atmosphere slightly compresses the CdO unit cell and widens the energy gap of CdO from 2.31 eV to 2.42 eV via a Burstein-Moss energy level shift. The optical properties were easily explained within the framework of Hamberg et al. band-to-band transitions and classical Drude theory. It was found that the greatest enhancement of electrical parameters that related to the transparent-conducting-oxide (TCO) function occurs by annealing in H₂-atmosphere for 30 min when the resistivity decreases, the conduction carrier concentration increases and the mobility increases. The results of the present work are important from a technical point of view for TCO production.
Abstract
In this work, nanogold particles incorporated onto europium oxide films at levels of 4% and 7% were fabricated by a vacuum evaporation technique on glass and silicon substrates held at 200 °C. Samples were investigated by x-ray diffraction and linear and nonlinear optical absorption. The linear optical absorption data were measured in the UV-visible-near infrared spectral regions and from these data the energy gap and the surface plasmon resonance were determined. The third order nonlinear optical properties of the nanogold particles incorporated onto europium oxide films were measured using the Z-scan technique. Nonlinear absorption and refraction were performed using a continuous wave laser at 633 nm. A large value of third order nonlinearities was obtained with the samples.
Abstract
The linear and nonlinear optical properties of a CdO film post-annealed in a hydrogen atmosphere for 30 min (CdO:H) were studied. The prepared CdO and CdO:H films were characterized by X-ray diffraction and UV- VIS-NIR absorption spectroscopy. Experimental data indicated that annealing in an H₂ atmosphere slightly compresses the CdO unit cell and widens the energy gap of CdO by about 3% relative to a non-hydrogenated film. This effect can be explained by the Burstein-Moss energy effect. The nonlinear absorption and nonlinear refractive index coefficients were determined and found to be higher than the values previously determined for nonhydrogenated CdO.

P12. Effect of Thallium Doping on the Electrical and Optical Properties of CdO Thin Films

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Physical Status Solid(a), 205(11), 2704-2710, 2008

Abstract
A series of lightly TI-doped CdO thin films (1%, 1.5%, 2%, 2.5%, and 3%) have been prepared by a vacuum evaporation method on glass and Si wafer substrates. The prepared films were subjected to structural study by X-ray diffraction, optical characterization by UV-VIS-NIR absorption spectroscopy, and dc-electrical measurements. Experimental data indicate the TI⁺⁺ doping slightly stretching stresses the CdO crystalline structure and changes the optical and electrical properties. It was observed that TI doping widens the energy gap of CdO from 2.22 eV to 2.83 eV via a Burstein-Moss energy level shift. The band gap shrinkage was also observed for carrier concentrations N ≥1.13x10²⁰ cm⁻³, which was explained by merging of the impurity band with the conduction band. The optical properties were explained by using Hamberg et al.’s band-to-band transitions and classical Drude theory. The electrical behavior of the samples shows that they are degenerate semiconductors. The 2% TI-doped CdO sample shows an increase in its mobility by about 1.4 times, conductivity by 5 times, and carrier concentration by 3.6 times relative to the undoped CdO film. From the transparent-conducting-oxide point of view, TI is sufficiently effective for CdO doping but does not emulate other dopants like In, Sn, Sc, and Y.

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Abstract
Electrical and optical properties of Tl-doped CdO films (CdO:TI) post-annealed in hydrogen atmosphere for different durations (15 min, 30 min, 45 min, and 60 min) were studied. The prepared films were characterized by the X-ray diffraction method and UV-VIS-NIR absorption-reflection spectroscopy. Experimental data indicate that annealing in H2-atmosphere removes gradually with time the internal structural micro-stress that created as a consequence of Tl doping into CdO structure. The band gap of the hydrogenated TI-doped CdO samples changes with H2-annealing time following the changing in the free-electron concentration. These results were found to be in agreement with the available bandgap widening and narrowing models. The optical properties were easily explained within the framework of Hamberg bandto-band transitions and classical Drude theory. It was found that the greatest enhancement of the electrical conduction parameters occurs by annealing of CdO:TI films in H2-atmosphere for 30-45 min when the conductivity increased by about 37% and the free-electron concentration increased by about 6%. The results of the present investigation are important for the transparent conducting oxide preparation technique.

P14. Optical and Structural Properties of Ag Nanoparticles Eu Oxide Films

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International Journal of Nanoscience, 7(6), 339-344 (2008)
Abstract
Silver-incorporated europium oxide thin films have been prepared by the successive evaporation method on quartz and silicon substrates. The silver concentration was 2.5% and 8.9% respectively, as measured by X-ray fluorescence. X-ray diffraction revealed that the Eu oxide of these samples remained amorphous after preannealing at 450°C; however, it crystallized in bcc structure at 800°C. The lattice parameter of the crystallized Eu oxide was larger than that of the bulk, due to the adsorption of Ag ions, which have a higher ionic radius. The optical absorption of the samples manifested the surface plasmon resonance (SPR) phenomenon, which varied with the Ag content and preannealings of the samples at different temperatures. The Ag nanoparticle radius was estimated with the Mie classical theory by using the SPR data analysis.