

Fluorescence and SEM-EDAX studies of erbium-doped $\text{SiO}_2\text{-GeO}_2$ preforms processed by MCVD

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Received 30 January 2002, accepted 15 July 2002

Abstract : The experimental studies on fluorescence and SEM-EDAX of the Er-doped $\text{SiO}_2\text{-GeO}_2$ glass in the form of preforms with different solution doping periods and doping concentrations are reported. The fluorescence lifetimes of erbium ions in different preforms are measured. The work will be useful for fiber-optic amplifiers.

Keywords : Erbium doped optical fiber, glass, SEM-EDAX, fluorescence

PACS Nos. : 42.81.Bm, 78.55.-m

Photoluminescence and thermoluminescence in Pr^{3+} activated ZBLAN fluoride crystalline phosphor

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Received 11 March 2002, accepted 22 August 2002

Abstract : The ZBLAN : Pr^{3+} crystalline phosphor prepared by solid state diffusion method has been reported. Photoluminescence and effects of ionising radiation on luminescence have been investigated in ZBLAN : Pr^{3+} . Photoluminescence study indicates that the intensity of emission at 400 nm is due to $^3\text{P}_2 \rightarrow ^3\text{H}_4$ transition of Pr^{3+} ions. The defects created by ionising radiation are studied by thermoluminescence technique. Thermoluminescence studies indicate two prominent glow peaks at 120 and 350°C due to two defect centres the positions of which are found to depend on the radiation dose and Pr^{3+} concentration in ZBLAN. Defect accumulation was noted to be strongly dependent on the level of γ -exposure. A suitable explanation of these results is suggested.

Keywords : ZBLAN : Pr^{3+} phosphor, photoluminescence, thermoluminescence

PACS Nos. : 78.55.Hx, 78.60.Kn

Study of heteroatom effect on graphitic carbons derived from anthracene phenanthrene-sulphur system by thermal and optical analysis

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Received 17 May 2001, accepted 13 August 2002

Abstract : The carbonaceous mesophase as a precursor to graphitization has been examined from polynuclear organic compounds, such as anthracene-sulphur and phenanthrene-sulphur systems with the aid of Differential Thermal Analysis (DTA), Thermogravimetric Analysis (TGA) and finally by the polarized-light technique. With the continued addition of sulphur-hydrogen mole ratio, the latent heat of fusion (i.e. activation energy) and as such the graphitizability of the carbons have been found to decrease. In addition to dehydrogenation, sulphur caused crosslinking between layer planes thus preventing the formation of oriented layers, typical of the graphite structure.

Keywords : Heteroatom, mesophase, DTA, TGA, latent heat of fusion, polarized light

PACS Nos. : 81.70.Pg, 81.05.Vw, 65.40.Gn.

Compositional and temperature dependent electrical behaviour of zinc- substituted copper- ferri-chromates

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Received 6 May 2002, accepted 11 September 2002

Abstract : The compositional and thermal variation of electrical properties of $\text{Zn}_x\text{Cu}_{1-x}\text{FeCrO}_4$ ($x = 0.0, 0.2, 0.4, 0.6$) spinel ferrite system were studied by means of d. c. resistivity and thermoelectric power measurements. The electrical parameters like Fermi - energy charge carrier concentration and mobility were determined and probable conduction mechanism in the system has been suggested.

Keywords : Ferrites, electrical properties, conduction mechanism.

PACS Nos. : 75.50. Gg, 72.80.Ga, 72.20.Pa

Thermally stimulated luminescence studies of undoped, Cu and Mn doped lithium borate compounds

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Received 6 May 2002, accepted 6 August 2002

Abstract : Thermally stimulated luminescence (TSL) studies of undoped, Cu and Mn doped $\text{Li}_2\text{B}_4\text{O}_7$ are reported in this paper. The polycrystalline samples of undoped and doped $\text{Li}_2\text{B}_4\text{O}_7$ were prepared by melting method. The formation of the undoped compound was checked by X-ray diffraction and Fourier transform infrared (FTIR) studies. The compound has orthorhombic structure at room temperature. In TSL studies undoped sample exhibits two glow peaks at the temperatures 190 and 280°C. The Cu-doped lithium tetraborate sample exhibits three glow peaks at the temperatures 185, 290 and 350°C whereas the Mn doped sample exhibits glow peaks at 190 and 300°C. Our results show that Cu-doped Lithium tetraborate is more sensitive and the TSL intensities of 185 and 290°C glow peaks in Cu doped $\text{Li}_2\text{B}_4\text{O}_7$ are enhanced by about 25 and 10 times respectively when compared with the corresponding glow peak intensities in undoped $\text{Li}_2\text{B}_4\text{O}_7$.

Keywords : Thermally stimulated luminescence, XRD, FTIR.

PACS Nos. : 78.60.Kn, 61.10.Nz

Monte Carlo calculation of electron transport in InSb

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Received 29 May 2002, accepted 9 August 2002

Abstract : The velocity field characteristics of InSb have been obtained at 77K by the Monte Carlo simulation technique. The results agree with the experimental data and also with those obtained by using the displaced Maxwellian distribution function. The effects of the various simulation parameters as well as that of the ionized impurity concentration on the mobility values for InSb have been discussed and results presented.

Keywords : Compound semiconductor, Monte Carlo simulation, mobility- field characteristics

PACS Nos. : 61.43.Bn, 72.20.Dp,

Anomalous electrical resistivity and Hall constant of Anderson lattice with finite f -band width

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Received 8 July 2002, accepted 11 September 2002

Abstract : We study here an extension of the periodic Anderson model by considering finite f -band width. A variational method is used to study the temperature dependence of electronic transport properties of Anderson lattice for different values of the f -band width. The electrical resistivity $\rho(T)$ and Hall constant $R_H(T)$ calculated show qualitatively the features experimentally observed in heavy fermion materials. We find that as f -band width increases, the low temperature peak in $\rho(T)$ disappears, while the low-temperature peak in $R_H(T)$ becomes sharper.

Keywords : Anderson lattice, electrical resistivity, Hall constant

PACS Nos. : 71.27.+a, 72.15.Qm.

Defect characterizations in solution-grown single crystals of magnesium sulphate heptahydrate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$) by chemical etch technique

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Received 18 September 2002, accepted 23 September 2002

Abstract : Chemical etch technique has been successfully employed on {010} faces of solution-grown single crystals of magnesium sulphate heptahydrate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$) for the first time with greater details. Growth hillocks, macrospirals and etch channels are the main features observed and interpreted. Surface structures of the etched pits were photographed in an optical microscope. Some photographs were also recorded with a scanning electron microscope.

Keywords : Magnesium sulphate heptahydrate, solution growth, etching, defect characterization

PACS Nos. : 64.75. +g, 61.72.Lk, 61.72.Ef

Measurement of α_s in e^+e^- annihilations

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Received 6 May 2002, accepted 11 September 2002

Abstract : We measure the coupling constant α_s between the quark and the gluon by two different methods. In the first method, we count the number of jets per event, and then compare the number of two and three jet events. The ratio of three to two-jet events gives us α_s . The second method employs the jet clustering algorithm introduced by the JADE group. Our results for both methods are in good quantitative agreement with the QCD theory. Our results are also consistent with those obtained from other experiments.

Keywords : e^+e^- annihilations, coupling constant, QCD theory

PACS No. : 12.38.-t.

Statistics of closed multi-component system : Entropy, fluctuation and stability

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Received 10 June 2002, accepted 9 August 2002

Abstract : The paper deals with the derivation of the probability distribution of a closed multi-component system, the expression of entropy-production for chemical reaction, the criterion of chemical stability and the generalized Le-Chatelier-Braun principle of chemical equilibrium on the basis of a probabilistic model of the closed multi-component system.

Keywords : Closed multi-component systems, maximum-entropy principle, probability distribution, entropy-production, chemical stability.

PACS Nos. : 05.70.Ln, 05.20.-y

Effect of lyoluminescence decay in KCl microcrystalline powder in lyoluminescence dosimetry of ionization radiations

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Received 4 April 2002, accepted 11 September 2002

Abstract : The lyoluminescent intensity of gamma irradiated potassium chloride powder of different particle sizes have been investigated. In the mesh range 75-250 μm , the lyoluminescence (LL) peak intensity increases with increasing particle size. Above 250 μm and upto 425 μm , the LL peak intensity decreases. For particle size greater than 425 μm , the LL peak intensity increases again. The LL glow curves show that LL decay times consist of two components for all particle sizes. The dependence of decay time, especially the longer component on the particle size has been investigated. Particle size has no significant effect on the shorter decay component in LL emission. A possible explanation for the experimental results has been attempted.

Keywords : Lyoluminescence, KCl.

PACS No. : 78.60.-b

Transient hot electron transport properties in ZnS:Mn

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Received 10 August 2001, accepted 8 July 2002

Abstract : The time dependence of transport properties of ZnS:Mn such as the total average electron velocity, the total average energy, the total average electron temperature and the average fraction number in central valley (G-valley) have been calculated for uniform electric fields. These calculations were used to determine the electron scattering mechanisms responsible for hot electron transient behaviour in ZnS:Mn at very high electric fields. In these calculations, the Monte Carlo method at the lattice temperatures of 77 and 300 K were used. Our results showed that the steady state conditions were reached within 0.5 pico second or less depending on the strength of the electric field and the lattice temperature. The essential feature of time transport is the overshoot behavior owing to the intervalley phonons scattering.

Keywords : ZnS : Mn semiconductor, transport properties, Monte Carlo method

PACS Nos. : 72.20.Ht, 02.50.Ng

X-ray diffraction studies of azo schiff base

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Received 8 July 2002, accepted 3 September 2002

Abstract : An X-ray diffraction study has been carried out for 4-[2' hydroxy salicylidene 5'-(2"-thiazolylazo)] toluene. This ligand was synthesized by condensing 5'-(2'-thiazolylazo) salicylaldehyde and *p*-toluidine. The purified sample has been subjected for structural characterization. The structure of compound is found to be tetragonal belonging to non-primitive system. The strain broadening effects are also examined and discussed.

Keywords : Azo schiff base, X-ray diffraction, strain broadening

PACS No. : 61.10.Nz

On the paramagnetic behavior of CaS: Pr phosphors

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Received 9 May 2002, accepted 15 July 2002

Abstract : Magnetic susceptibility of CaS:Pr has been studied at room temperature (300°K) by varying the concentration of Pr from 0.004 to 0.120% by weight. Paramagnetic behavior of Pr ions is explained using tri/tetra valent state of Pr along with cluster hypothesis. This study shows that activator enters CaS lattice in trivalent state at lower concentration and in tetravalent state at higher concentration. Clustering of ions occurs at 0.02% by weight of Pr and above.

Keywords : Magnetic susceptibility, CaS:Pr

PACS Nos. : 78.55.Hx, 75.30.Cr
