



Turkish Journal of Physics

Turkish Journal

Micro-Crystallographic, Optical and Transport Studies of $\text{Cd}_{0.7}\text{Zn}_{0.3}\text{Se} : \text{Sb}$ Thin Films

of
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Abstract: $\text{Cd}_{1-x}\text{Zn}_x\text{Se}$ thin film structures doped with various concentrations of trivalent antimony were chemically deposited onto glass-substrates. These structures were then characterised through the XRD, SEM, optical and electrical characterization techniques. The X-ray diffractograms of both as-prepared and Sb-doped samples were obtained and analysed. The analysis revealed that the samples are microcrystalline over the whole range of the doping concentration (0 to 2 mol %). It is striking that the intensities of hexagonal and cubic reflections of CdSe went on increasing with doping concentration upto 0.1 mol % and decreased with further increase in Sb^{3+} content in the film whereas peak intensities corresponding to cubic ZnSe remained almost constant. The optical studies showed a little shift in the absorption edge, typically from 600 nm to 650 nm for the change of Sb concentration from 0 to 0.1 mol % . The optical transitions are found to be of the direct type with the values of m nearly 0.5 for all films. The electrical transport studies showed increase in the conductivity with doping concentration up to 0.1 mol % and the conductivity decreased for further increase in the doping concentration. Typically the conductivity improved by an order at 450 K whereas these changes are more significant at around 300 K. The thermo-power measurements gave n-type conduction of the samples and the variation of thermoelectric power with temperature is nonlinear. Other film characteristics, namely activation energy of an electrical conduction, carrier concentration, mobility and intercrystalline barrier potential, were determined from these observations and their temperature and composition dependence have been examined.

Turk. J. Phys., **26**, (2002), 101-108.

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