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Some Characteristic Properties

V. B. PUJARI
Rayat Shikshan Sanstha's, Modern College, Vashi, Navi-Mumbai 400703, M. S., INDIA
e-mail: vbpujari2002@rediffmail.com
V. B. GAIKWAD, E. U. MASUMDAR, P. D. MORE and L. P. DESHMUKH
Thin Film and Solar Studies Research Laboratory, Department of Physics,
Shivaji University Centre for P. G. Studies, Solapur -- Pune Road, Kegaon, Solapur 413002, M. S., INDIA

Abstract: This paper presents some information regarding (Cd, Hg) Se materials synthesized by a simple chemical growth process and the structural, optical and electrical transport properties. The growth of these films depends on various preparative parameters and deposition conditions such as concentration of the starting materials, pH, temperature, time, speed of mechanical churning, etc., and the reaction kinetics suggests that the films grow into two different phases: one, initialy an almost linear phase; and second, a saturation phase. The deposits were analysed chemically and by an EDS techniques. It has been seen that more than 70% of the materials taken in the reaction bath get deposited on the substrate. The variation of x_{film} with x_{bath} is nonlinear. The as-deposited films consists of crystals of hexagonal wurtzite and cubic zinc blend phases of both CdSe and HgSe. The optical absorption studies revealed a high absorption coefficient (10^4-10^5 cm^{-1}) with direct type of transitions. The estimated band gap follows a nonlinear decay, typically from 1.72 eV to 1.06 eV , as the composition parameter x (Hg-content) was varied from 0 to 0.2. The structural and optical studies showed that the solid solution of the kind Hg_x Cd_{1-x} Se is observed for the values of x ranging between 0 \leqslant x \leqslant 0.05. The dc electrical conductivity is found to increase continuously with an increase in the composition parameter x up to 0.05 and remains more or less constant for higher values of x. The material exhibits both grain boundary scattering limited and a variable range hopping conduction mechanisms. The thermoelectric power is negative showing n-type conduction of the samples. Both carrier concentration n and mobility μ were determined from these studies and found to be dependent on the temperature and film composition.

Key Words: Pseudo-binaries, Chemical synthesis, Optical and transport properties, MCS, Growth Kinetics

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