

Accepted Manuscript

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PII: S1658-3655(17)30061-4
DOI: <http://dx.doi.org/doi:10.1016/j.jtusci.2017.05.001>
Reference: JTUSCI 384

To appear in:

Received date: 8-7-2016
Revised date: 25-5-2017
Accepted date: 25-5-2017

Please cite this article as: S.Rajathia, K.Kirubavathi, Selvaraju K., Preparation of nanocrystalline Cd doped PbS thin films and their structural and optical properties (2010), <http://dx.doi.org/10.1016/j.jtusci.2017.05.001>

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Preparation of nanocrystalline Cd doped PbS thin films and their structural and optical properties

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Abstract

The PbS and Cd doped PbS nanocrystalline thin films prepared by chemical bath deposition technique, deposited at 80°C onto glass substrates. The aqueous solution containing precursors of Cd²⁺ and Pb²⁺ has been used to obtain good quality film deposits at optimized preparative parameters. The characterization of the films were carried out using X-ray diffraction, optical absorption, photoluminescence properties, scanning electron microscopy and energy dispersive X-ray analyses have been performed to explore the properties of PbS and Cd doped PbS films. The prepared films were adherent to the substrate and well crystallized according to cubic structure with preferred orientation. According to X-ray diffraction analysis the crystallite size of the films is decreasing from 74nm to 64nm with increasing of Cd doping. The optical properties were determined from ultraviolet-visible spectroscopy measurements in the absorbance energy range of 300-1200nm. From the UV-visible analysis shows that the band gap value of PbS thin films increased from 2.12eV to 2.65eV by doping of Cd concentration.

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