

Study of Nanocrystalline Al Doped ZnS Thin Films by Chemical Bath Deposition Method

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Abstract : New nanosized materials are in huge expansion worldwide. They play a fundamental role in various industrial applications thanks their unique and functional properties. Moreover, in recent years, a great effort has been made to the design and control fabrication of nanostructured semiconductors such zinc sulphide. In recent years, much attention has been accorded in doped and co-doped ZnS to improve the ZnS films quality. We present in this work the preparation and characterization of ZnS and Al doped ZnS thin films. Nanoparticles ZnS and Al doped ZnS films are prepared by chemical bath deposition method (CBD), for various dopant concentrations. Thin films are deposited onto commercial microscope glass slides substrates. Thiourea is used as sulfide ion source, zinc acetate as zinc ion source and manganese acetate as manganese ion source in alkaline bath at 90 °C. X-ray diffraction (XRD) analyses are carried out at room temperature on films and powders with a powder diffractometer, using CuK α radiation. The average grain size obtained from the Debye-Scherrer's formula is around 10 nm. Films morphology is examined by scanning electron microscopy. IR spectra of representative sample are recorded with the FTIR between 400 and 4000 cm⁻¹. The transmittance (70 %) is performed with the UV-VIS spectrometer in the wavelength range 200–800 nm. This value is enhanced by Al doping.

Keywords : ZnS, nanostructured semiconductors, thin films, chemical bath deposition

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