

OPTICAL AND ELECTRICAL PROPERTIES OF PBS THIN FILMS GROWN BY CHEMICALLY BATH DEPOSITION [CBD] AT DIFFERENT LEAD CONCENTRATIONS

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Abstract

Lead sulphide [PbS] thin films were deposited on glass slide substrates using the chemical bath deposition [CBD] technique at room temperature for 120 minutes. Optical properties of the thin films were measured by spectrophotometer and then other optical and solid state properties were determined by simulating transmittance data in the wavelength range of 260–2000 nm using a software. The software made use of three optical models of simulation; the OJL model, the Drude model and the Kronig Kramer Relation [KKR] model for analysis. Complex dielectric function [ϵ], band gap [E_g], refractive index [n], absorbance [A], extinction [k] and absorption coefficients [α] were examined as a function of wavelength and photon energy. Further analysis revealed that PbS thin films had a band gap of 0.88 eV, optical transmittance below 55 % in the near infrared range and high absorbance in the visible range of the spectrum suitable for solar cell.

Keywords: Optical and electrical properties; Chemical Bath Deposition process; Sulphide; wavelength Band gap; Model