

SnS Thin Films Prepared by Chemical Spray Pyrolysis method

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Abstract : Tin sulfide (SnS) is interesting semiconductor that found application in several fields such as photovoltaic and gas sensor due to its interesting optical and electrical properties. In the present study, chemical spray pyrolysis deposition (CSP) was used to deposit tin sulfide (SnS) thin films onto glass substrates at 350°C. The starting solutions were prepared by the dilution of SnCl₂ and thiourea in distilled water. The structural, optical and electrical properties of the films were determined using X-ray diffraction, UV visible transmittance and Hall Effect measurements respectively. The influences of flow rate (10, 15 and 20 ml/h) on the structural, optical and electrical properties were determined. The XRD data confirms that the films prepared at low flow rate are a mixture of SnS and Sn₂S₃ phases. However, when the flow rate is increased; structures of the films are amorphous. From the UV-visible transmittance in the visible range we noticed that films optical band gap value ranged from 1.2 to 1.5 eV. The Hall Effect measurements indicate that SnS thin film exhibits p-type conduction with a conductivity decrease by two orders from 5.15×10^{-3} to $5.8 \times 10^{-7} (\Omega \cdot \text{cm})^{-1}$.

Keywords : Tin sulfide, solar cell, UV-visible, spray pyrolysis