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EFFECT OF DEPOSITION PERIOD AND BATH TEMPERATURE ON THE PROPERTIES OF ELECTRODEPOSITED Cu_4SnS_4 FILMS

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ABSTRACT
Cu_4SnS_4 thin films were prepared by electrodeposition method in aqueous solutions. The effect of various bath temperatures (25, 35, 45 °C) and deposition periods (15, 30, 45 min) on growth of these films was reported. The structure and morphology characteristics of thin films of Cu_4SnS_4 grown on indium tin oxide glass substrates were investigated by X-ray diffraction and atomic force microscopy techniques. The optical properties were measured to determine the transition type and band gap value. The thin films produced were found to be polycrystalline with orthorhombic structure. The X-ray diffraction data showed that the most prominent peak at $2\theta = 30.2°$ which belongs to (221) plane of Cu_4SnS_4. The atomic force microscopy image indicated that the films deposited at 25 °C for 45 min exhibited smaller crystal size with uniformly distributed on indium tin oxide substrates. Photoelectrochemical test shows a p-type conduction mechanism. The bandgap was found to be 1.68 eV with direct transition.

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