Effect of deposition period and pH on chemical bath deposited Cu4SnS4 thin films

ABSTRACT

Cu4SnS4 thin films were prepared through chemical bath deposition technique. The effect of deposition period and pH was studied to determine the optimum condition for deposition process. The structure and morphology of thin films were investigated by X-ray diffraction and atomic force microscopy, respectively. The optical properties were measured to determine transition type and band gap value. The thin films produced were found to be polycrystalline with orthorhombic structure. X-ray diffraction data showed that the most intense peak at $2\theta = 30.2°$ which belongs to (221) plane. As the deposition period was increased up to 80 min, the film gradually grew thicker as shown by the AFM images. It is observed that the best crystallinity of film is obtained at pH 1.5. Also, AFM images revealed that the grains were distributed evenly over the substrate surface. The bandgap value was found to be 1.9 eV with direct transition.

Keyword: Metal chalcogenides; Optical properties; Semiconductor; X-ray diffraction