

Abstract

Preparation and characterization of chalcopyrite compound for thin film solar cells

CuInS₂ thin films were electrodeposited onto indium tin oxide substrate by the electrodeposition technique. Cyclic voltammetry and chronoamperometry were carried out to determine the optimum pH and the amount of sodium thiosulfate for electroplating CuInS₂ compound. The composition, crystallinity and optical properties of the compounds synthesized were studied by energy dispersive X-ray (EDX), (SEM), X-ray diffraction and UV–Visible spectra. It was found that the increasing pH shifts the electrodepositions voltage toward more negative and lowers the deposition current. Increasing the amount of sodium thiosulfate also decreases the deposition current but it has no effect on the deposition potential. It was concluded that CuInS₂ with atomic stoichiometric ratio was prepared at pH equals 1 and 150 ml of 0.1 M sodium thiosulfate, 5 ml of 0.1 M indium chloride and 5 ml of 0.1 M copper acetate. The energy gaps were calculated to be 1.6, 1.7 and 1.75 eV for CuInS₂ prepared at 1, 1.5 and 2 of pH, respectively. It was indicated that the amount of the sodium thiosulfate has a slight effect on the energy gap.