Abstract

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Preparation and characterization of chalcopyrite compound for thin film solar cells

CulnS2 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; the amount of sodium thiosulfate for electroplating CulnS2 compound. The composition, crystallinity; optical properties of the compounds synthesized were studied by energy dispersive X-ray (EDX), (SEM), X-ray diffraction; UV–Visible spectra. It was found that the increasing pH shifts the electrodepositions voltage toward more negative; 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 CulnS2 with atomic stoichiometric ratio was prepared at pH equals 1; 150 ml of 0.1 M sodium thiosulfate, 5 ml of 0.1 M indium chloride and 5 ml of 0.1 M cupper acetate. The energy gaps were calculated to be 1.6, 1.7; 1.75 eV for CulnS2 prepared at 1, 1.5; 2 of pH, respectively. It was indicated that the amount of the sodium thiosulfate has a slight effect on the energy gap.