Effects of electrolytes concentration on the chemically deposited Cu4SnS4 thin films

ABSTRACT

Cu4SnS4 thin films have been deposited on indium tin oxide glass substrates from aqueous acidic bath using chemical bath deposition. The disodium ethylenediaminetetraacetic acid was used as a complexing agent. Deposition at different concentrations was attempted in order to study the effect of electrolytes concentration on the film properties and to get good quality photosensitive materials. The structure and surface morphology of films were studied by X-ray diffraction and atomic force microscopy. The optical properties were measured to determine transition type and band gap value. The X-ray diffraction analysis showed the presence of polycrystalline in nature. Also, the films exhibited orthorhombic structure with a sharp (221) plane. The films prepared using higher concentration showed better photosensitivity compared with lower concentration. The AFM images of these films showed the surface of substrate was covered completely. Optical absorption shows the presence of direct transition with band gap energy of 1.7 eV.

Keyword: Bandgap energy; Semiconducting material; Chemical bath deposition; Solar cells; Thin films