

The effect of spin coating rate on morphology and optical properties of cuprous oxide thin film prepared by sol-gel technique

Abstract

Cuprous oxide thin films were successfully grown on indium tin oxide (ITO) coated glass by sol-gel spin coating using diethanolamine (DEA) as a solubility agent. The films were annealed at 350 °C in 5% H₂ + 95% N₂ atmosphere. The films were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and ultraviolet-visible (UV-vis) spectroscopy. The effect of spinning rate on deposition on the microstructure, thickness and optical properties of cuprous oxide films was investigated. Based on the SEM micrographs of the as obtained films, we found that the grain size decreases with the increase in spinning rate. At the rate of 6000 rpm, the film shows better coverage with the rounded shape grain size is about 45 nm. Optical absorbance of the films was in the regions of 400-800 nm wavelengths. The optical band gap values of the films are in the range of 2.0-2.2 eV.

Keywords — Cuprous oxide, energy band gap, sol-gel, solar cell, thin films