

Annealing and light effect on structural and electrical properties of thermally evaporated Cu₂SnSe₃ thin films.

Abstract

Thin films of Copper Tin Selenide (Cu₂SnSe₃), were successfully deposited on well-cleaned glass substrates by thermal evaporation technique. The as-deposited films were annealed in flowing purified nitrogen, N₂, for 2 h in the temperature range from 100 to 500°C. The annealing temperature effect on thin films crystallization and light effect on electrical conductivity had been investigated. X-ray diffractometer (XRD) and Atomic force microscope (AFM) were used for the investigation of structural behavior of Cu₂SnSe₃ thin films. These studies revealed that the films were structured in mixed phases between cubic space group F-43m (no. 216) and orthorhombic space group P n m a (no. 62) belonging to Cu₂SnSe₃ and SnSe, respectively. The results determined from Scherrer calculation method showed that increasing in annealing temperature resulted in direct increase of crystallite size and average grain size. The annealing effect on surface morphologies and the light effect on I-V characteristics of Cu₂SnSe₃ thin films were reported and it was found that the current increased with increasing annealing temperature and light intensity. Photosensitivity of Cu₂SnSe₃ thin films decreased with increasing annealing temperature but increased with increasing light intensity.

Keyword: Cu₂SnSe₃; Thermal evaporation; Annealing effect; Electrical properties; Photosensitivity; Thin films.