

## **X-Ray diffraction analysis of thermally evaporated copper tin selenide thin films at different annealing temperature.**

### **Abstract**

Semiconductor thin films copper tin selenide,  $\text{Cu}_2\text{SnSe}_3$ , a potential compound for solar cell applications or semiconductor radiation detector were prepared by thermal evaporation method onto well-cleaned glass substrates. The as-deposited films were annealed in flowing purified nitrogen,  $\text{N}_2$ , for 2 h in the temperature range from 100 °C to 500 °C. The structure of as-deposited and annealed films has been studied by X-ray diffraction technique. The semi-quantitative analysis indicated from the Reitveld refinement show that the samples composed of  $\text{Cu}_2\text{SnSe}_3$  and  $\text{SnSe}$ . These studies revealed that the films were structured in mixed phase between cubic space group F-43m (no. 216) and orthorhombic space group P n m a (no. 62). The crystallite size and lattice strain were determined from Scherrer calculation method. The results show that increasing in annealing temperature resulted in direct increase in crystallite size and decrease in lattice strain.

**Keyword:**  $\text{Cu}_2\text{SnSe}_3$ , semiconductor, thermal evaporation, X-ray diffraction, thin films, solar cell.