

Synthesis and electrical studies of quaternary chalcogenide semiconductor $\text{Cu}_2\text{ZnSnSe}_4$

ABSTRACT

Quaternary chalcogenide semiconductor has attracted much attention as absorber-layer materials in solar cells. The absorber-layer material, $\text{Cu}_2\text{ZnSnSe}_4$ (CZTSe) which is a p-type semiconductor that has high absorption coefficient, had been synthesized by using solvothermal method. The variation of concentrations of the Copper (II) Chloride dihydrate have brought some effects towards producing the stoichiometry and non-stoichiometry copper zinc tin selenide that may lead to the improvement of efficiency of solar cells. The synthesized reaction was conducted at 250°C for 24 hours. Properties of the samples have been characterized by X-ray diffraction (XRD) to determine the crystal structure of the sample and X-ray Fluorescence (XRF) to determine the elemental composition of the sample. The electrical properties such as resistance and conductivity have been studied through Van der Pauw configuration. The CZTSe has been successfully synthesized at concentrations of 0.15 M with no impurities phases existed.

Keyword: $\text{Cu}_2\text{ZnSnSe}_4$; Electrical property; Solvothermal method; Van der Pauw