

Preparation of CZTS thin films by using electrospraying method

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Solar cells are alternatives as clean energy sources. $\text{CuIn}_{1-x}\text{Ga}_x\text{Se}_2$ (CIGS) has been a major candidate due to its large optical absorption coefficient. However, CIGS used toxic and high-cost materials so that environmental and cost-effective sources were studied. CZTS ($\text{Cu}_2\text{ZnSnS}_4$) has a structure obtained by replacing the indium and gallium. To fabricate CZTS based solar cells, CZTS used for p-type absorber layer should have band-gap energy of approximately 1.5 eV. CZTS thin films were prepared by atom beam sputtering, co-evaporation etc. but those methods used high-cost equipment and specific reaction conditions. In the present study, CZTS thin films were prepared by using electrospray method. The surface structure of the prepared films was investigated by using SEM and AFM, crystallinity was examined by using XRD. The transmittance was measured by using UV-Spectrometer and band-gap energy was calculated by using optical property data. The annealing of thin films improved film uniformity and crystallinity. Also, the band-gap property was discussed in terms of structural property of films.