

Growth of $\text{Cu}_2\text{ZnSnS}_4$ thin films by sulfurization of precursors in S vapor

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Abstract : $\text{Cu}_2\text{ZnSnS}_4$ thin films were grown by sulfurization method. ZnS/SnS/Cu precursors were deposited onto soda lime glass and Mo coated glass substrates by electron beam and dc sputtering. These stacks were annealed in S vapor in the temperature range 450–550°C for 30 min in a quartz tube furnace system. Film properties were characterized using XRD, SEM, EDX techniques. XRD spectra of the sulfurized films showed single phase Kesterite structure with preferred (112) orientation. As the annealing temperature increased Sn loss in the films was observed. This may be due re-evaporation Sn from the film. The morphology of the films was improved with increasing the annealing temperature, at 550°C films exhibited large grain and dense cross sectional morphology. Absorption coefficient and optical band gap were evaluated from the optical measurements found to be 10^4 cm^{-1} and 1.47 eV respectively. $\text{Cu}_2\text{ZnSnS}_4$ films grown in this study can be used as absorbers for fabrication thin film solar cells.

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