

## Investigations of RF Magnetron Sputtered $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) Absorber Layer Using X-ray Photoelectron Spectroscopy for Thin Film Solar Cell

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### Abstract

$\text{Cu}_2\text{ZnSnS}_4$  (CZTS), a quaternary compound semiconductor, is an earth abundant and sustainable semiconductor material that is used as an absorber layer for thin film solar cells. In the present work, CZTS thin films were deposited onto soda lime glass (SLG) substrates by RF magnetron sputtering using the stacking sequence CuS / ZnS / SnS at a substrate temperature of 300°C. The samples were then sulphurised at 400°C in  $\text{H}_2\text{S}$  atmosphere for 60 min. A comparison of as-deposited and sulphurised CZTS thin films are discussed in this paper. The composition of the CZTS thin film samples were studied using X-ray photoelectron spectroscopy, which revealed the presence of Cu, Zn, Sn, S in 2:1:1:4 ratio respectively. The presence of O and C was also detected due to atmospheric contamination. It is evident from the atomic % calculation that the stoichiometry has improved for the sulphurised samples. The formation of stoichiometric CZTS is an important factor to use it as an absorber layer in a thin film solar cell. Thus, from the XPS results it is obvious that the sulphurised CZTS thin films can be used as absorber layer in a thin film solar cell.