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Growth of Cu_2ZnSnS_4(CZTS) by Pulsed Laser Deposition for Thin film Photovoltaic Absorber Material ABHISHEK NANDUR, BRUCE WHITE, State University of New York at Binghamton — CZTS (Cu_2ZnSnS_4) has become the subject of intense interest because it is an ideal candidate absorber material for thin-film solar cells with an optimal band gap (1.5 eV), high absorption coefficient (10^4 cm^{-1}) and abundant elemental components. Pulsed Laser Deposition (PLD) provides excellent control over film composition since thin films are deposited under high vacuum with excellent stoichiometry transfer from the target. CZTS thin films were deposited using PLD from a stoichiometrically close CZTS target ($Cu_{2.6}Zn_{1.1}Sn_{0.7}S_{3.44}$). The effects of laser energy fluence and substrate temperature and post-deposition sulfur annealing on the surface morphology, composition and optical absorption have been investigated. Optimal CZTS thin films exhibited a band gap of 1.54 eV with an absorption coefficient of $4x10^4 cm^{-1}$. A solar cell utilizing PLD grown CZTS with the structure SLG/Mo/CZTS/CdS/ZnO/ITO showed a conversion efficiency of 5.85% with V_{oc} = 376 mV, J_{sc} = 38.9 mA/cm^2 and Fill Factor, FF = 0.40.

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