

Synthesis of Copper Zinc Tin Sulfide $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) nanocrystals and characterization of its

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The $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) has become promising because it is an ideal candidate absorber material for future non-toxic, low cost thin-film solar cells. The CZTS materials have a low band-gap of 1.49eV and a large absorption coefficient $> 10^4 \text{ cm}^{-1}$ in visible wavelength region. The suitable direct band gap energy of the CZTS nanocrystals (NCs) is ideal for its use in solar cells applications. The CZTS NCs are successfully synthesized using microwave-assisted solution method. Copper (II) acetylacetonate, Zinc acetylacetonate hydrate, and tin (II) chloride dihydrate were used as the starting materials. And also oleylamine, 1-dodecanethiol were used as the solvent and sulfur source, respectively. The structure, optical and electrical characteristics of CZTS NCs have been investigated by HR-TEM, FE-SEM, EDS, X-ray diffraction, Raman spectroscopy, UV-Vis absorption spectroscopy and Hall effect measurement. The results showed that the CZTS NCs are in single wurtzite CZTS phase without other secondary phases, and the chemical composition of the nanocrystals are nearly stoichiometric.