**Abstract**

Nanoparticles of Cu2SnS4 (CTS) have been synthesized by the facile Chemical Route Method. Structural, morphological and optical characterization studies of the synthesized CTS nanoparticles have been performed by X-ray diffraction (XRD), Energy Dispersive Spectroscopy (EDS), Scanning Electron Microscope (SEM)andUV-VIS-NIR Spectroscopy (UV). The structure and phase of the synthesized nanoparticles have been confirmed by XRD. Based on the EDS results, the stoichiometry of the Cu2SnS4 (CTS) nanoparticles has been determined and the elemental distribution studied by mapping analysis. The optical absorption studies revealed that the CTS nanoparticles have direct optimal band gap in the range from 1.29 to 1.5eV, which indicates that these nanoparticles are potential absorber materials for thin film photovoltaic applications. The synthesized CTS nanoparticles can be transformed to the ink form, which can be used to directly coat large area thin film solar cells.