**Abstract**

Ternary semiconductor Cu2SnS4 (CTS) nanoparticles have been synthesized by the facileChemical Route Method. Structural, morphological and optical characterization studies of the synthesized CTS nanoparticles have been performed by X-ray diffraction (XRD), Raman Spectroscopy, Energy Dispersive Spectroscopy (EDS), Scanning Electron Microscope (SEM)and UV-VIS Spectroscopy (UV). XRD and Raman spectroscopy are used to confirm the structure and phase. Based on the EDS result, the stoichiometry of the Cu2SnS4 (CTS) was 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.