**Abstract**

Phase pure quaternary chalcogenides are promising materials for photovoltaic applications. The incorporation of transition metal cations into any semiconductor systems can lead to very interesting physical and chemical properties which make them suitable for applications in optoelectronic devices. In this study, Cu2NiSnS4 (CNTS) quaternary nanoparticles have been synthesized by the facile chemical route method. The structural, morphological, optical and electrical characteristics of the synthesized nanoparticles have been analyzed. The results obtained confirm the formation of phase pure CNTS nanoparticles. The average crystallite size of the synthesized nanoparticles is estimated to be around 30 nm. The obtained optical band gap values of the synthesized CNTS nanoparticles are in good agreement with the optimum value required for an absorber material in photovoltaic solar energy-conversions. The present work explores the viability of synthesizing nanoparticles (CNTS) with elements which are abundantly available by using an environmentally-friendly and low-cost process which is potential for energy- conversion applications.