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Thermoelectric Properties of Polyol Method Synthesized Cu₂Te Nanoparticles

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Crystalline, morphological and dynamic light scattering studies of copper telluride nanoparticles (NPs) synthesized successfully using diethylene glycol have been carried out. X-ray diffraction (XRD) measurements confirm phase purity and hexagonal crystal structure of the NPs. The crystallite size evaluated using Scherer formula is 34 nm. Field emission scanning electron microscopic study confirms the disc-like shape of average size 45 nm NPs, slightly bigger than that of Scherer size. This is 850 nm from dynamic light scattering measurements deionized water (DIW) associated with a zeta potential of -17.74 mV indicating instability in DIW. These NPs exhibit room-temperature Seebeck coefficient (S) and electric conductivity (σ) of 10.5 $\mu\text{V/K}$ and 1166 S/m, respectively, which result in a power factor ($S^2\sigma$) of 0.13 $\mu\text{W}/(\text{mK}^2)$. Positive sign of S is indicative of holes as the dominant carrier in the material. Further, this material exhibit metallic behavior in the temperature range 5 K–325 K.