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Investigation of Thermoelectric Power of CuInGaTe_2 Single Crystals

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Thermoelectric power values of CuInGaTe_2 (CIGT) single crystals were estimated without precedent for a wide temperature range. An authorial unique design dependent on Bridgman procedure for crystal growth from the melt has been utilized to prepare our sample. The single crystals show a p -type conductivity within the full range of temperature. Experimental examination has been made of the variety of electrical conductivity and thermoelectric power with CIGT single crystals. The holes and electrons effective masses, the mobilities of the electrons and holes, and the diffusion length of the majority and minority carriers were determined at room temperature. The electron and hole diffusion coefficients in CIGT single crystals are $D_n = 7.938 \text{ m}^2/\text{s}$ and $D_p = 7.365 \text{ m}^2/\text{s}$, respectively. Additionally, the holes and electrons relaxation times were derived from the mobilities. These outcomes give us a complete and clear picture for the main physical parameters essential for the industrial applications.

Keywords: chalcopyrite semiconductors, thermoelectric power, CuInGaTe_2 single crystals.