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Thermal Transport Properties of $TlInTe_2$ Single Crystals

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Abstract. Thallium indium ditelluride single crystal, was prepared by a special design constructed by our group. A brass working chamber designed for measuring (TEP) in a wide range of temperature was used. The experimental results indicates that $T1InTe_2$ is of p-type conductivity. The mobility of charge carriers, holes and electrons was found to be 2.129×10^3 cm^2 / *V*, sec and 1.218×10^5 cm^2 / *V*, sec respectively. The effective masses of the majority and minority carriers were deduced to be 5.367×10^{-37} kg and 6.856×10^{-43} kg respectively. The diffusion coefficient, relaxation time and diffusion length for holes was calculated to be 551.436 cm^2 / sec, 7.142×10^{-21} sec and 1.986×10^{-9} cm respectively. Also D_n . τ_n , L_n for the electrons was calculated to be 3.156×10^3 cm^3 / sec, 5.222×10^{-26} sec and 1.284×10^{-11} cm respectively. In addition to these pronounced parameters, the efficiency of the thermoelectric element (figure of merit) was evaluated, which leads to better application in many fields .

Keywords: $TlInTe_2$, single crystals, thermoelectric power, semi-conductor, charge carriers.