

## **Electrical and Thermal Transport Properties of TiGaSe<sub>2</sub> Single Crystals**

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*Abstract.* The electrical conductivity ( $\sigma$ ) and Hall coefficient ( $R_H$ ) of single crystals prepared by a special modified Bridgman technique have been investigated over the temperature range 245-495 K. Our investigation showed that our samples are p-type conducting. The dependence of the Hall mobility on temperature was presented graphically. The forbidden energy gap was calculated and found to be 2.1 eV whereas the ionization energy of the impurity level was 0.36 eV. The values of the electrical conductivity, Hall coefficient and carrier concentration at room temperature were  $1.87 \times 10^{-6} \Omega^{-1} \text{cm}^{-1}$ ,  $3.98 \times 10^9 \text{cm}^3 \text{C}^{-1}$  and  $1.57 \times 10^9 \text{cm}^{-3}$  respectively. The Hall mobility at room temperature ( $\mu_H$ ) was found to be  $7.46 \times 10^3 \text{cm}^2 \text{V}^{-1} \text{s}^{-1}$ . Also, the thermoelectric power (TEP) was investigated in the temperature range 271-493 K. The combination of the electrical and thermal measurements in the present investigation makes it possible to find various physical parameters such as mobilities, effective mass, relaxation times, diffusion coefficients and diffusion lengths both for majority and for minority carriers, Also figure of merit was determined. These parameters reveal the general behavior of this semiconductor.

*Keyword:* Hall coefficient, TiGaSe<sub>2</sub>, mobility, thermal properties, electrical properties.