

MAGNETIC AND OPTICAL PROPERTIES OF $\text{Pb}_{1-x}\text{Sn}_x\text{Te}$ SEMICONDUCTOR

ABSTRACT

In this study, we investigate the magneto-optical properties of $\text{Pb}_{1-x}\text{Sn}_x\text{Te}$ theoretically. When external static magnetic fields and an electromagnetic field were applied to the different crystal direction, we studied how the physical properties of the sample varies and how complex refracted index varies whit the magnitude of external static magnetic fields.

We found the effective mass tensors of each fermi surface and then the conductivity tensors for lead-tin-salt ($\text{Pb}_{1-x}\text{Sn}_x\text{Te}$). Total conductivity tensor was calculated. We found the complex refracted index from the relation between dielectric and conductivity tensor. We obtained information about optical properties of sample by interpreting variation curves of the complex refractive index of the sample as a function of applied external static magnetic field.

In this study, the external static magnetic field \vec{B} was applied along $\langle 110 \rangle$ and $\langle 001 \rangle$ crystal directions and the electromagnetic field vector was applied along $\langle 001 \rangle$ crystal direction.

Key Words: Brillouin Zone, Effective Mass, Tensor, Dielectric Anomaly, Cyclotron Resonance, Fermi Surface, Complex Refractive Index Energy Gap.