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# Intrinsic semiconductor conductivity

Consider the general conductivity equation

$\sigma = n e \mu_e + p e \mu_h$ n-Type $n \gg p$ $\sigma = n e \mu_e$

$\sigma = n e^2 \tau / m_e^*$ P-Type $p \gg n$ $\sigma = p e \mu_h$

drift mobility = $\mu_e$ and $\mu_h$

$\mu_e = \frac{e \tilde{\tau}_e}{m_e^*}$ $\mu_h = \frac{e \tilde{\tau}_h}{m_h^*}$ $\tilde{\tau}_h$ and $\tilde{\tau}_e$

how $\mu_e$ and $\mu_h$ depends on Temp and presences of Rese dopent

$\tilde{\tau} = \frac{1}{S v_{Th} N_s} = [S]$

$S$ = cross section of scatterer

$v_{th}$ = Thermal velocity of $\bar{e}$

$N_s$ = concentration of scatterer / vol

$\frac{1}{[m^2][m/s][m^3]}$

Mobility=The ratio of the velocity to the applied field is called the mobility

***Role of scatters and the effect on mobility can be considered by considering the two main types of***

## Lattice Constant

if we have intrinsic semiconductor (e or h) will scatter because the Thermal vibration of the atoms

$S = \pi a^2$ a =(amplitude of this vibrations)

$S \propto T$ as $\uparrow T$ $a \uparrow$ $s \uparrow$

$\bar{e}$ move in condetion band → uniform potential Region

Thermal energy = KE