

## On the conductivity of silicon and electron mobility

by Amanda Falke

### *Purpose*

I originated and completed this brief assignment on my own to provide proof of understanding.

### *Conductivity of silicon in real world applications*

[The Wikipedia article on electric resistivity and conductivity](#) states that the conductivity of silicon at 20 degrees C is  $1.56 \times 10^{-3}$ .

What is 20 degrees Celsius? It's about 300K.

$$K = C + 273.15$$

$$K = 20C + 273.15 = 293.15K \sim 300K \text{ room temp}$$

Assume "lightly doped" at  $10^{13} = N_d$

$$\sigma = q N_d \mu$$

$$1.56 \times 10^{-3} = 1.6 \times 10^{-19} \times 10^{13} \times \mu$$

$$\frac{1.56 \times 10^{-3}}{1.6 \times 10^{-19} \times 10^{13}} = \mu$$

$$\sim \frac{10^{19}}{10^3 \times 10^{13}} = \mu$$

$$\sim \frac{10^{19}}{10^3 \times 10^{13}} = \mu$$

$$\sim \frac{10^{19}}{10^{16}} = \mu = 10^3 \dots \textit{about 1K.}$$