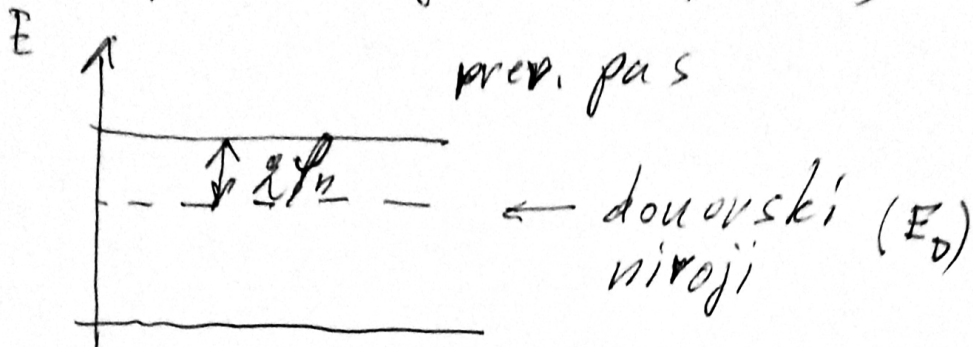


E_F v dopiranem polprevodu:

n-tip (analogno za p-tip)



$$n = n_0 e^{-\Delta\phi_n/kT} \approx N_D$$

$$(n_0 = 2 \left(\frac{2\pi m_e kT}{h^2} \right)^{3/2})$$

$$\Delta\phi_n \approx E_c - E_F$$

$$e^{-(E_c - E_F)/kT} = \frac{N_D}{n_0}$$

$$\frac{E_c - E_F}{kT} = \ln \frac{n_0}{N_D}$$

$$E_F = E_c + kT \ln \frac{N_D}{n_0}$$

$$n_i^2 = n_0^2 e^{-E_g/kT} \rightarrow n_0^2 = n_i^2 e^{E_g/kT}$$

$$E_F = E_C + kT \ln \frac{N_D}{n_i e^{-E_g/2kT}}$$

$$E_F = E_C - \frac{E_g}{2} + kT \ln \frac{N_D}{n_i}$$

$$\underbrace{\hspace{10em}}_{E_{F,i}}$$

~~$$E_F = E_C + kT \ln \frac{N_D}{n_i}$$~~

$$E_F = E_{F,i} + kT \ln \frac{N_D}{n_i}$$

$$N_D \sim 10^{17} / \text{cm}^3 \quad n_i \sim 10^{10} / \text{cm}^3 \quad kT \sim 0,025 \text{ eV}$$

$$E_F - E_{F,i} \sim 0,5 \text{ eV}$$

$$E_F > E_D \quad E_{F,i} + kT \ln \frac{N_D}{n_i} > E_D$$

$$kT \ln \frac{N_D}{n_i} > E_D - E_{F,i} \sim \frac{E_g}{2}$$

$$\frac{N_D}{n_i} \gtrsim e^{E_g/2kT} \sim 5 \cdot 10^8$$