HW 16.

Thursday, November 5, 2020 4:34 PM

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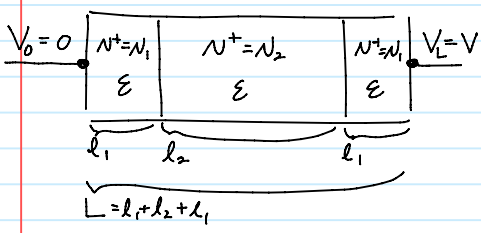


B.C. : $\phi_{(0)} = V_T \ln\left(\frac{n_i}{N_1}\right)$, $\phi_{(L)} = \phi_{(0)} + V$

$n_{(0)} = n_{(L)} = N_1$

$\left(V_T = \frac{k_B T}{q},\ n_i = 1.075 \times 10^{16}\ m^{-3},\ T = 300\ K\right)$

* Newton method로 HW15. 와 같이 $\phi_{(x)}, n_{(x)}$를 구한다.

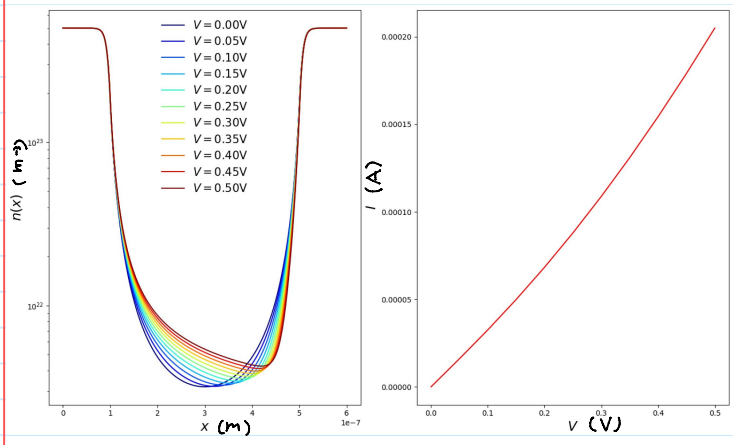
Current $I = J_{(0)} \cdot A = q\mu \left[n \frac{d\phi}{dx} - V_T \frac{dn}{dx} \right]_{x=0} \cdot A$ where A는 단면적, μ는 mobility.

⇒ I vs. V graph를 보자.

Results.

$\mu = 1500\ cm^2/V{\cdot}s$, $\varepsilon = 11.7\varepsilon_0$, $l_1 = \frac{L}{6}$, $l_2 = \frac{4}{6}L$, $N_1 = 5 \times 10^{23}\ m^{-3}$, $N_2 = 2 \times 10^{21}\ m^{-3}$

i) Long structure : L = 600 nm, spacing 1 nm



ii) Short structure : L = 60 nm, spacing 0.1 nm