

HWS MoS

①

① $N_A = 10^{16} \text{ cm}^{-3}$

$W_M = 4.1 \text{ eV}$. $\chi = 4.05 \text{ eV}$

* nMOS

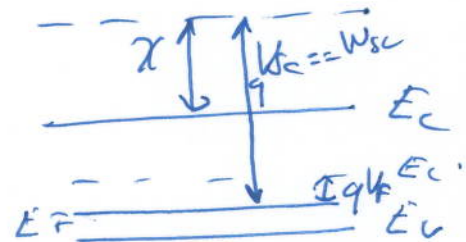
$$qV_{FB} = W_M - W_{sc}$$

$$W_{sc} = \chi + \frac{E_g}{2} + (E_c - E_F)$$

and $(E_c - E_F) = k_B T \ln\left(\frac{N_A}{n_i}\right) \approx 0.349 \text{ eV} = qV_F$

$\Rightarrow W_{sc} \approx 4.954 \text{ eV}$

$$\Rightarrow qV_{FB} = -0.854 \text{ eV}$$



$$V_T = V_{FB} + 2V_F + \frac{\sqrt{4 \epsilon_s \epsilon_0 q N_A V_F}}{C_{ox}}$$

$\approx 0.42 \text{ V}$

$$\Rightarrow V_T \approx 0.26 \text{ V}$$

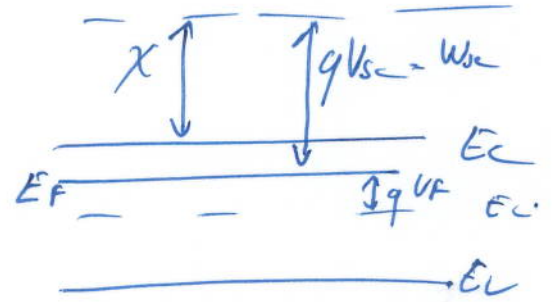
$$C_{ox} = \frac{\epsilon_{ox}}{t_{ox}}$$

and $t_{ox} = 30 \text{ nm}$
 $\epsilon_{ox} = 3.9 \epsilon_0$

② p pos $N_d = 10^{16} \text{ cm}^{-3}$

②

* $q\psi_{FB} = W_{sc} - V_{sc}$



$W_{sc} = x + \frac{E_g}{2} - (E_f - E_i)$

$(E_f - E_i) = k_B T \ln\left(\frac{N_d}{n_i}\right) \approx 0.369 \text{ eV} = qV_T$

~~$W_{sc} \approx 0.156 \text{ eV}$~~

$W_{sc} \approx 4.256 \text{ eV}$

$qV_T \approx -0.156 \text{ eV}$

* p pos

new formula

$V_T = V_{FB} - 2V_T - \sqrt{\frac{4\epsilon_{si} q N_d V_T}{C_{ox}}}$

surface potential and depletion charge } charge of sign

$\Rightarrow V_T \approx -1.27 \text{ V}$

(3)

