ECE344 Fall08

HOMEWORK 5

MOS

1. Calculate the flatband voltage of a silicon nMOS capacitor with a substrate doping $N_a = 10^{16} cm^{-3}$ and an aluminum gate (with a "work function" $W_M = 4.1eV$, and electron affinity $\chi = 4.05eV$). Calculate the threshold voltage with a $30nm$ thick oxide ($\epsilon_{ox} = 3.9\epsilon_0$).

2. Repeat question 1 for a Silicon pMOS capacitor with a substrate doping $N_d = 10^{16} cm^{-3}$.

3. Let us consider the MOS transistor configurations given in Fig. 1a and Fig. 1b Complete the following table indicating what it is happening in the different cross sections at the interface Oxide/Semiconductor (Flat-band, Accumulation, Depletion or Inversion ?) .

	at $x = d$ or $x = -d$	$x = 0$
Figure 1 (with $V_G > V_T$ $V_T > 0$)		
Figure 2 (with $V_G < V_T$ $V_T < 0$)		

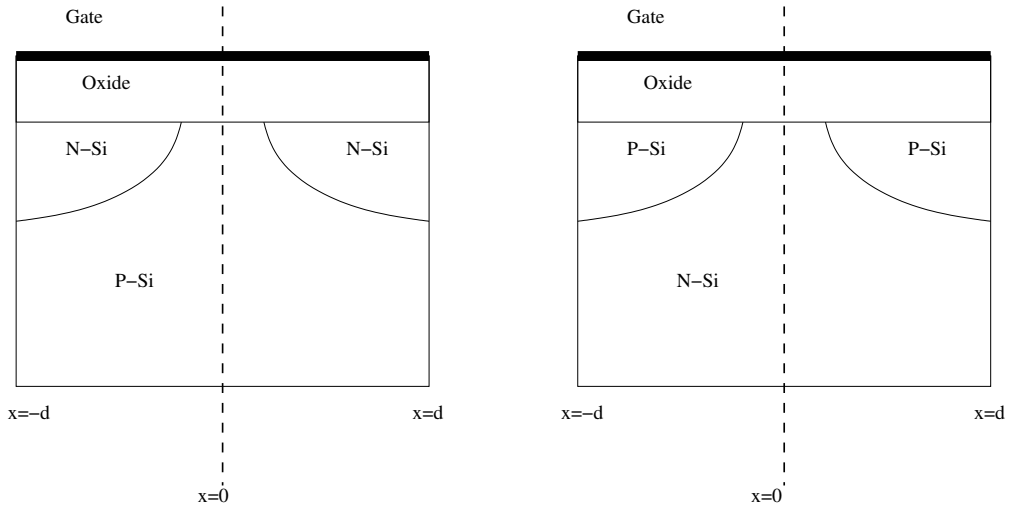

Figure 1: Fig 1a (left) and Fig 1b (right)