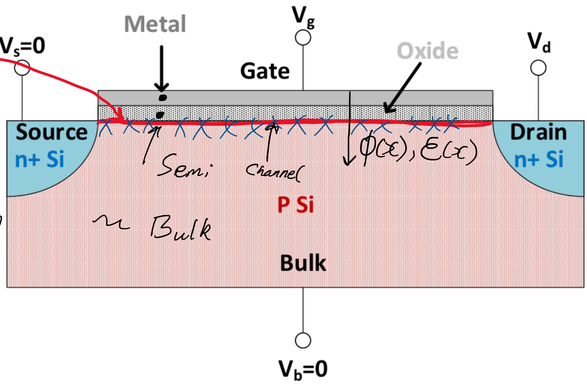
MOSFETs Part 3: The MOS System

Friday 13 March 2020 10:11

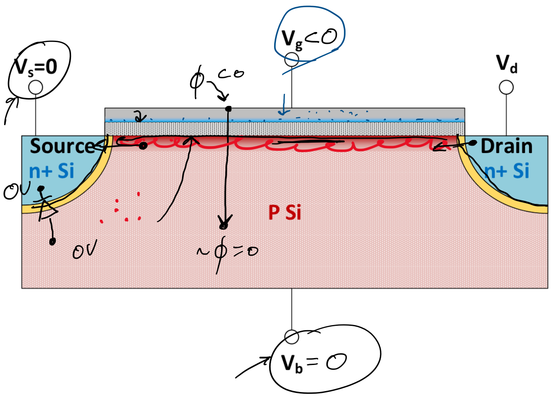
What is MOS ?

- A transistor
  - ↳ I in a channel is Modified by V_G
- Metal → Oxide → Semi
- $V_G \rightarrow \phi(x) \rightarrow E(x) \rightarrow$ Move around Carriers



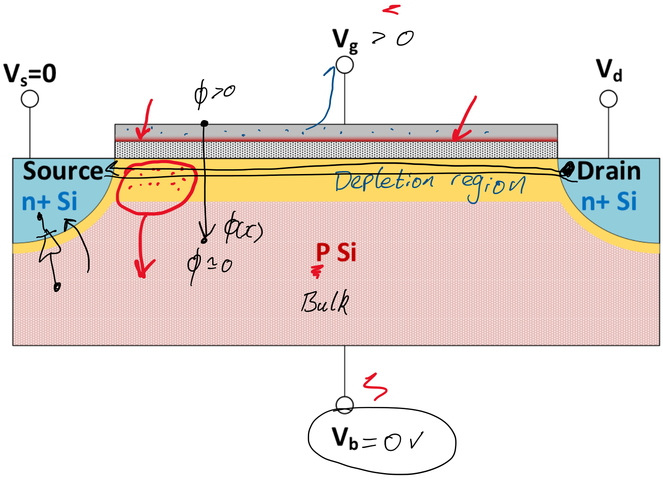
Accumulation

- Set $V_g < 0$
- Creates ϕ gradient along device
- e in gate → attracted to MO interface
- h in the Bulk attracted to the SO interface
- No Conduction due to junc. depletions → Device is off



Depletion

- $V_g > 0$, Small
  - ↳ Positive $\phi(x)$ near the channel
- holes pushed into Bulk
- ↳ Depletion region is formed in the channel
- No Conduction
  - ↳ Device is off

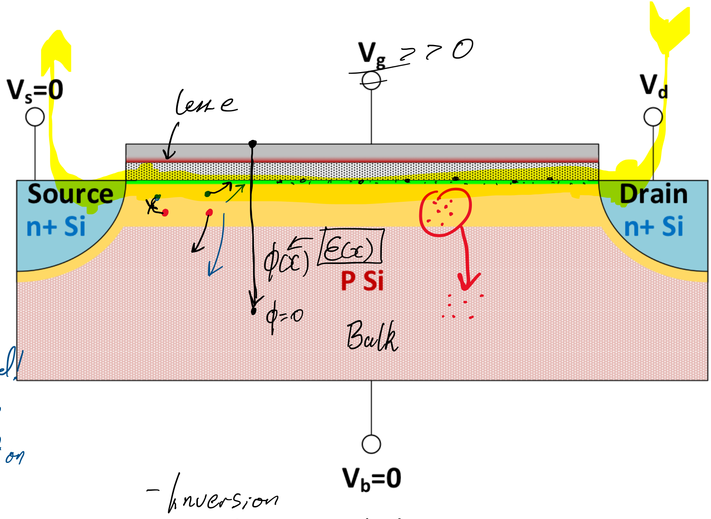


Minority Carrier Inversion

- $V_g >> 0$, Large
  - ↳ large $\phi(x)$ G→B
  - " $E(x)$
- less e MO interface
- h are repelled from Channel into bulk
- Looks like depletion!

* eh pairs always generated!

- In depletion, they recombine
  - ↳ not available for conduction
- h is attracted to bulk
- e is attracted to SO interface
- Conductive channel is formed
- The device is ON!! ✓



- Inversion Channel controlled by V_g