

● Diody typu MIS.

"Physics of Semiconductor Devices" S.M.Sze

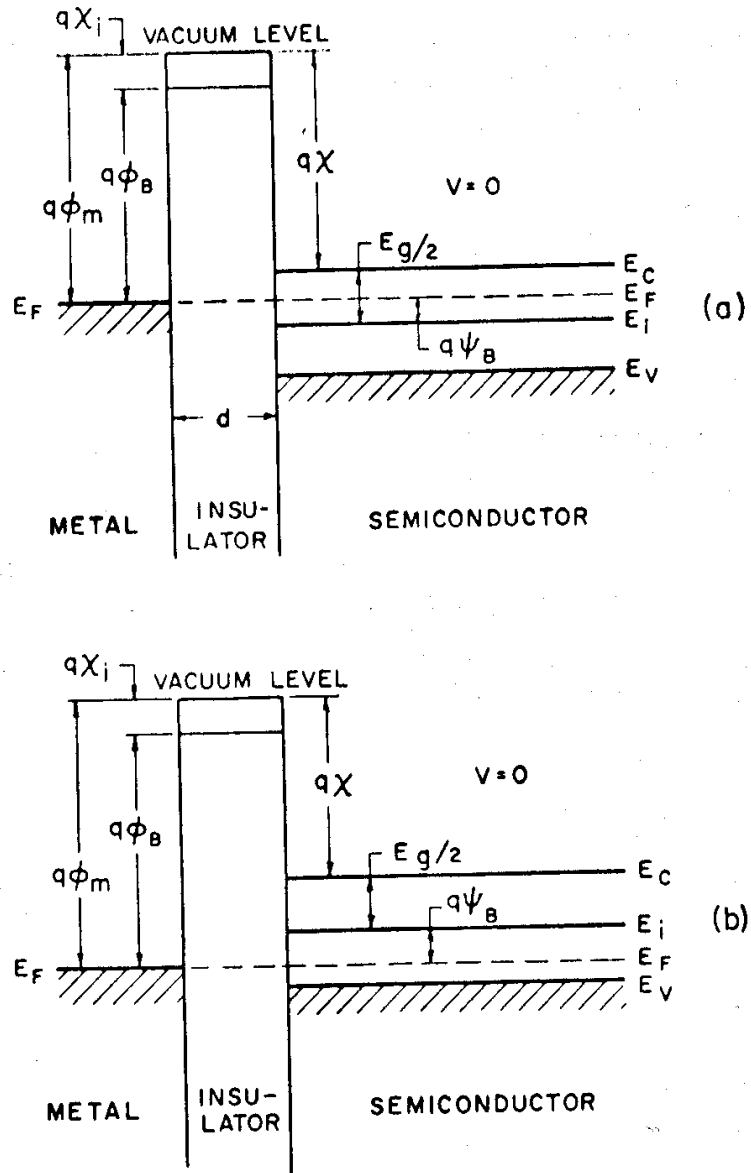
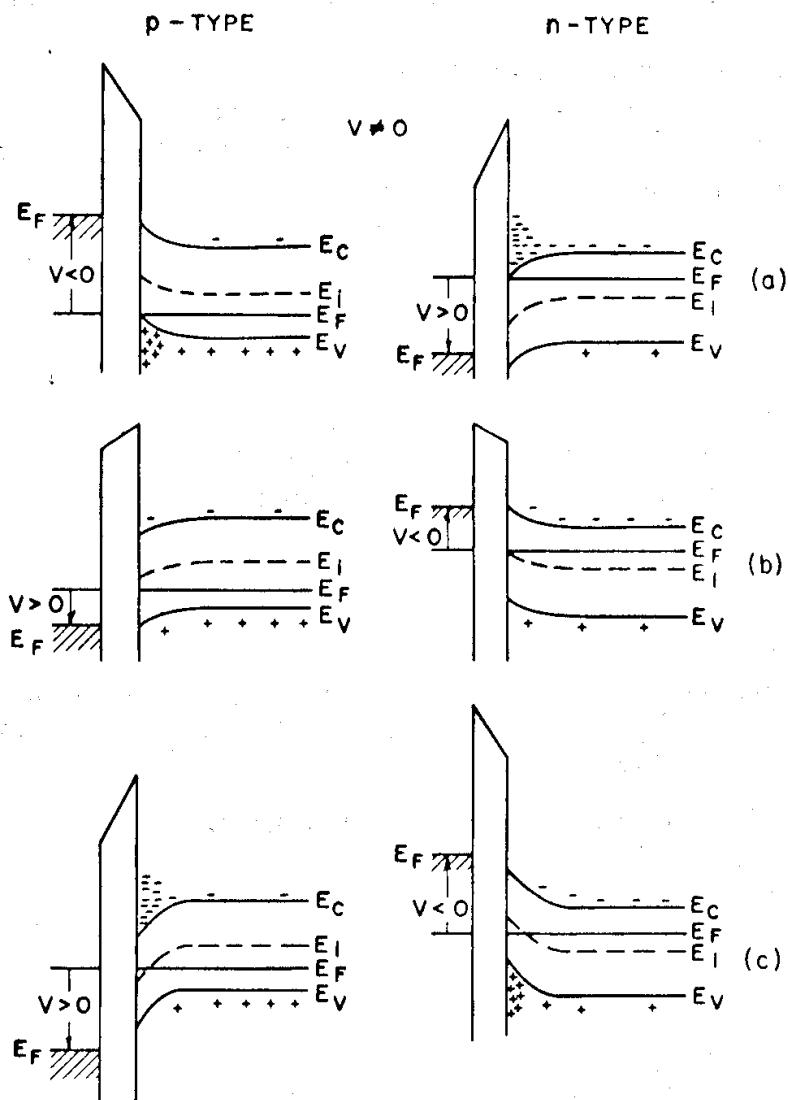
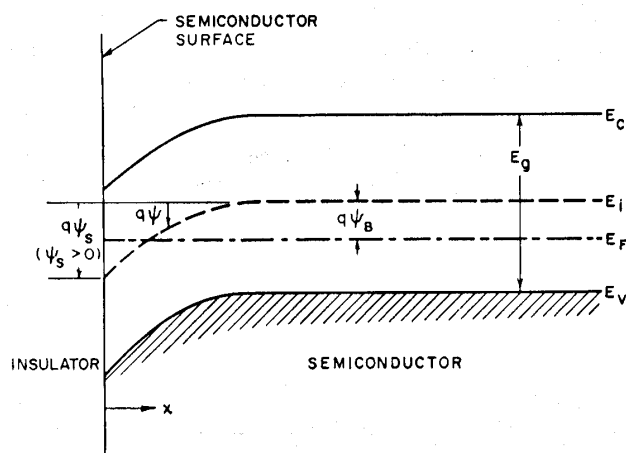


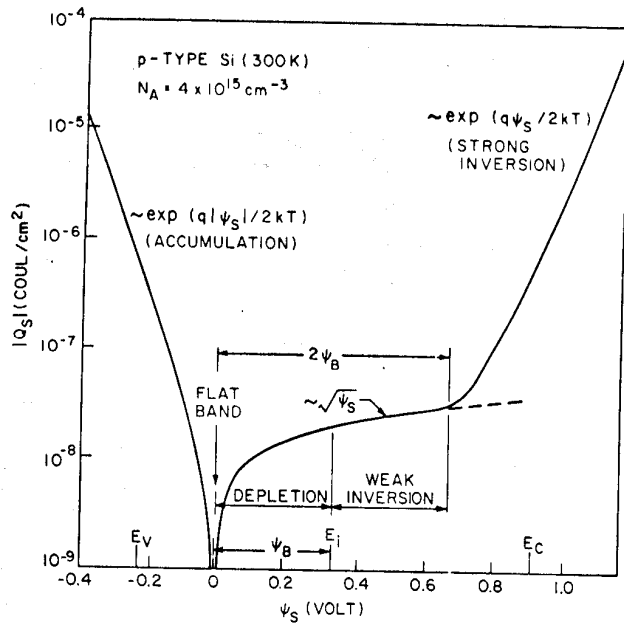
Fig. 2 Energy-band diagrams of ideal MIS diodes at  $V=0$ . (a) n-type semiconductor. (b) p-type semiconductor.



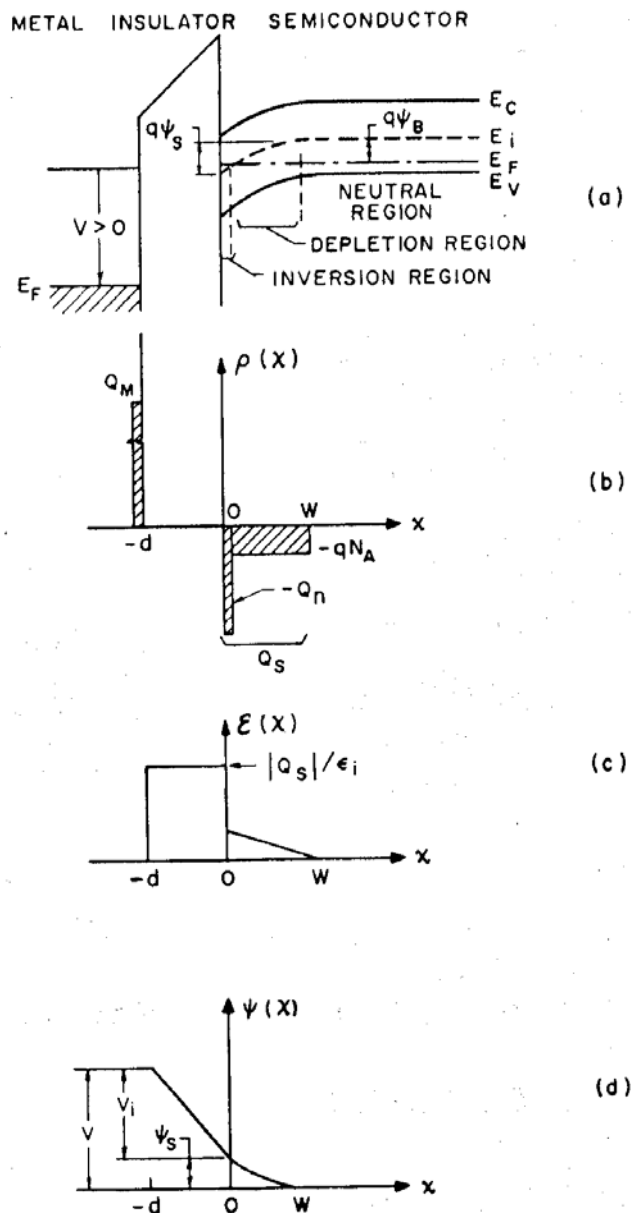
**Fig. 3** Energy-band diagrams for ideal MIS diodes when  $V \neq 0$ , for the following cases: (a) accumulation; (b) depletion; (c) inversion.



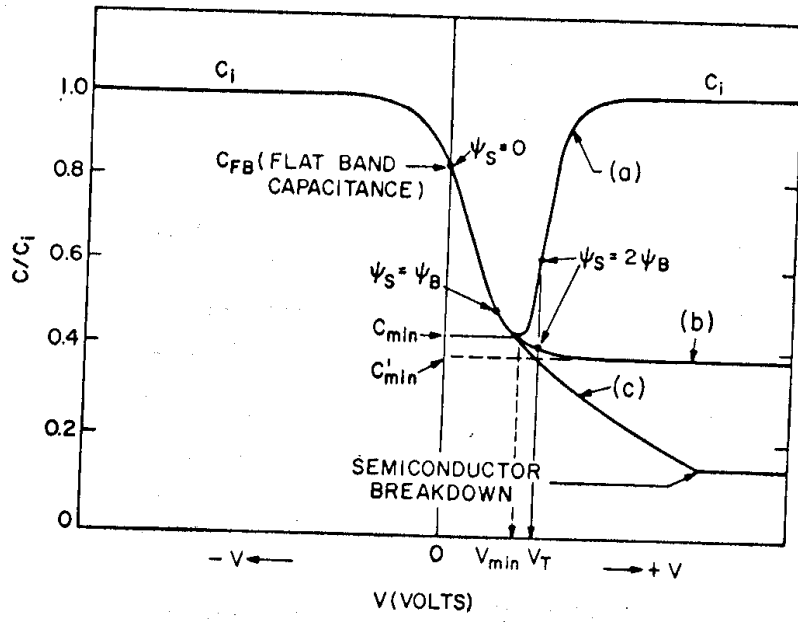
**Fig. 4** Energy-band diagram at the surface of a  $p$ -type semiconductor. The potential  $\psi_s$ , defined as zero in the bulk, is measured with respect to the intrinsic Fermi level  $E_i$ . The surface potential  $\psi_s$  is positive as shown. (a) Accumulation occurs when  $\psi_s < 0$ . (b) Depletion occurs when  $\psi_B > \psi_s > 0$ . (c) Inversion occurs when  $\psi_s > \psi_B$ .



**Fig. 5** Variation of space-charge density in the semiconductor as a function of the surface potential  $\psi_s$  for a p-type silicon with  $N_A = 4 \times 10^{15} \text{ cm}^{-3}$  at room temperature;  $\psi_B$  is the potential difference between the Fermi level and the intrinsic level of the bulk semiconductor. (After Garrett and Brattain, Ref. 13.)



**Fig. 6** (a) Band diagram of an ideal MIS diode. (b) Charge distribution under inversion condition. (c) Electric field distribution. (d) Potential distribution.



7 MIS capacitance-voltage curves. (a) Low frequency. (b) High frequency. (c) Deep depletion. (After Grove et al., Ref. 16.)