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

S.M. Sze, "Phys. of Semi. Dev.," 2nd ed. Wiley, 1981, p. 369.

$\psi_B \equiv \phi_{PB}$ class notes

(a) *Accumulation* of majority carriers near surface.

(b) *Depletion* of majority carriers from surface.

(c) *Inversion*: accumulation of minority carriers near surface.
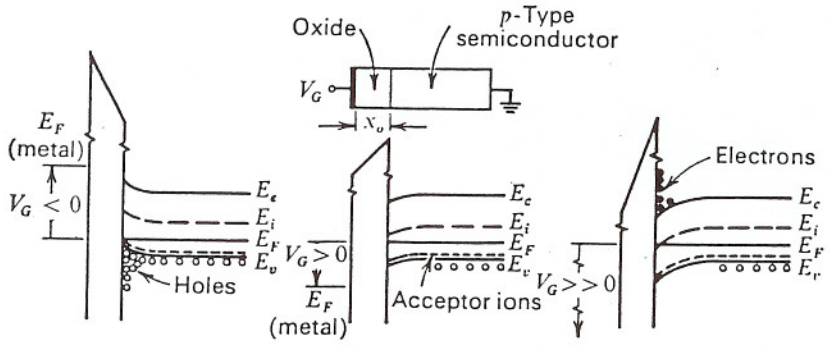
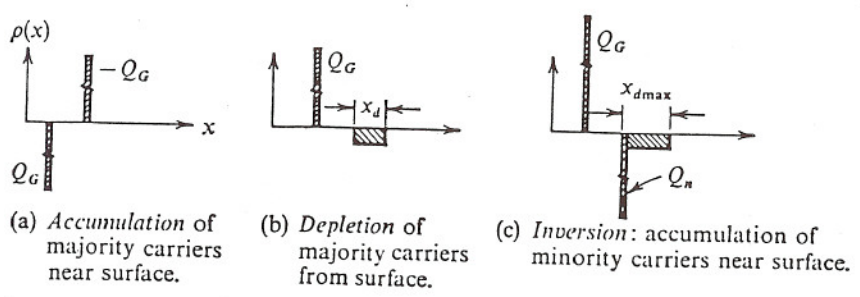A.S. Grove, "Phys. & Tech. of Semi. Dev.," Wiley, 1967, p. 266

Fig. 9.3 Energy bands and charge distribution in an MOS structure under various bias conditions, in the absence of surface states and work function difference.[3]