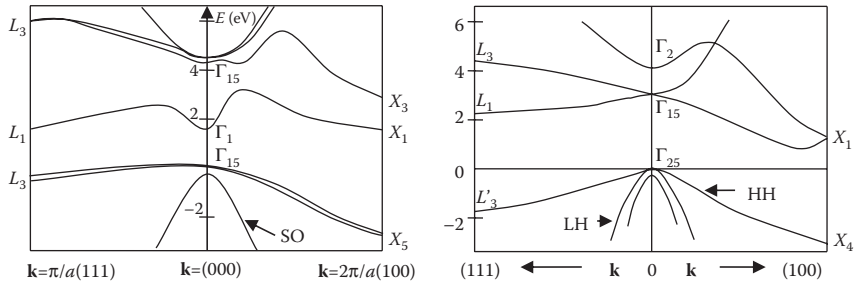

FIGURE 2.1
Band structure of (a) GaAs and (b) Si, calculated by the empirical pseudopotential method.

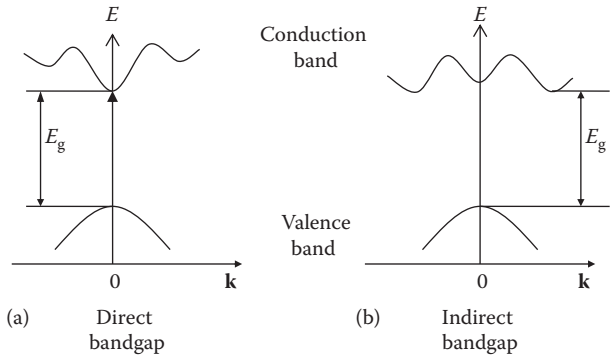

FIGURE 2.2
(a,b) Simple E–**k** diagram for a direct- and indirect-bandgap semiconductor.

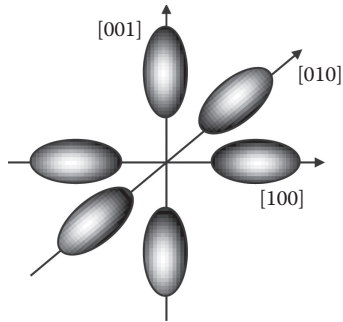

FIGURE 2.3
Constant energy surfaces in *X* valleys of Si in the **k**-space.

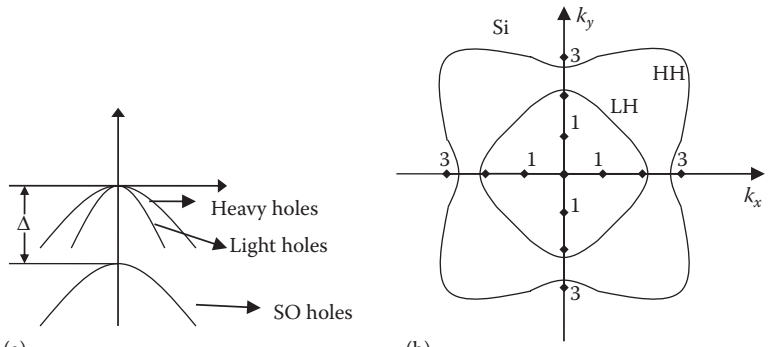

FIGURE 2.4
(a,b) E–**k** relation for valence bands in Si and GaAs.

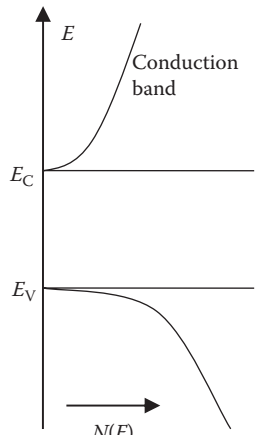

FIGURE 2.5
Density of state functions in the conduction and valence band.

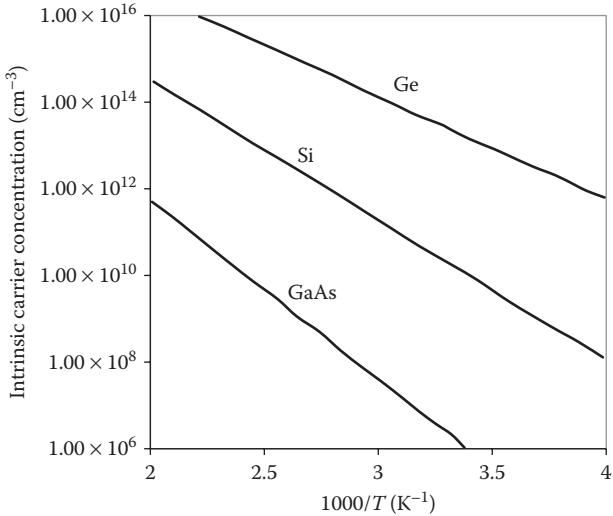

FIGURE 2.6
Intrinsic carrier concentration of Ge, Si, and GaAs as a function of inverse temperature.

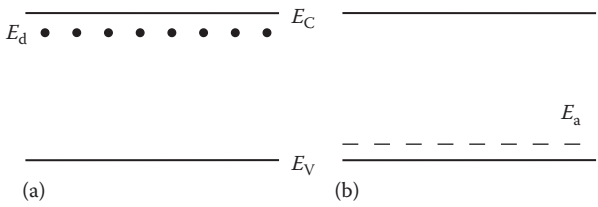

FIGURE 2.7
Formation of (a) donor and (b) acceptor energy levels in an extrinsic semiconductor.

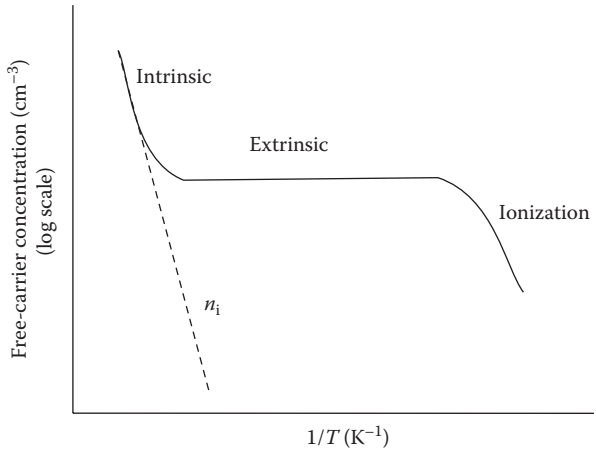

FIGURE 2.8
Variation of free-carrier concentration with temperature in a doped sample.

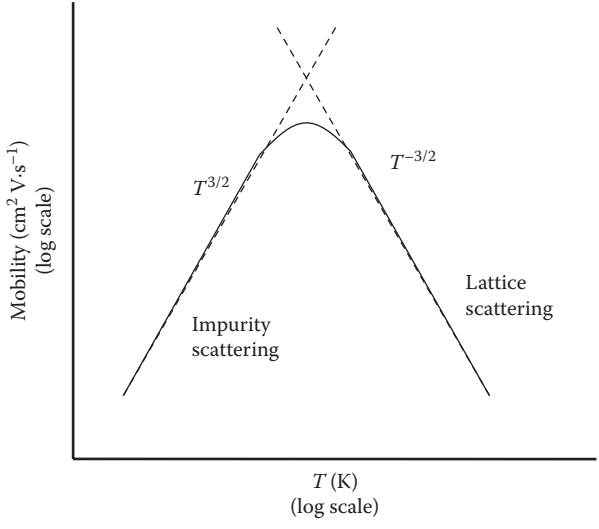

FIGURE 2.9
Approximate variation of the mobility with temperature.

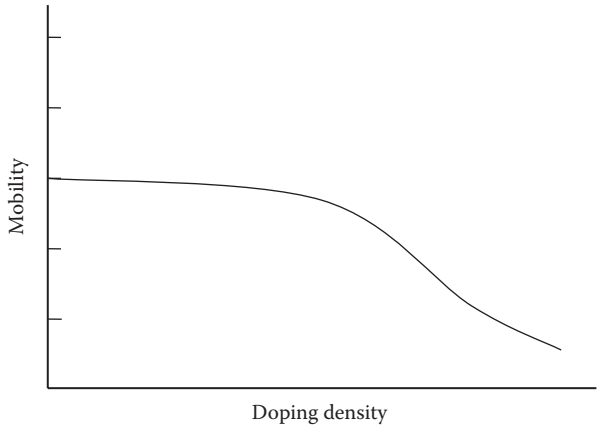

FIGURE 2.10
Approximate variation of the mobility with doping density at a fixed temperature.

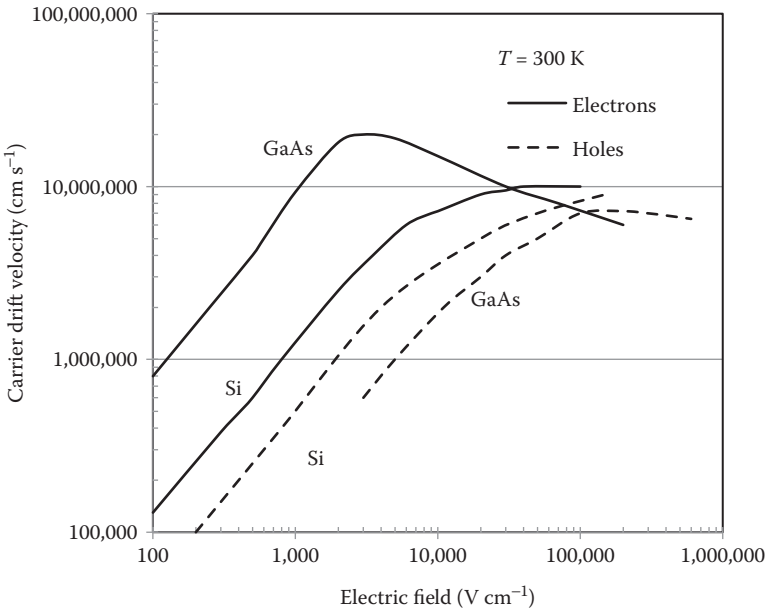

FIGURE 2.11
Variation of the drift velocity in Si and GaAs with an electric field.

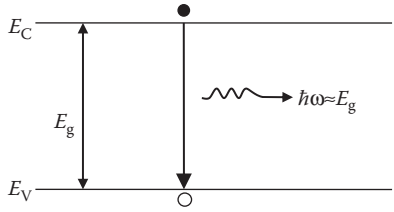

FIGURE 2.12
Direct band-to-band recombination processes annihilating an EHP.

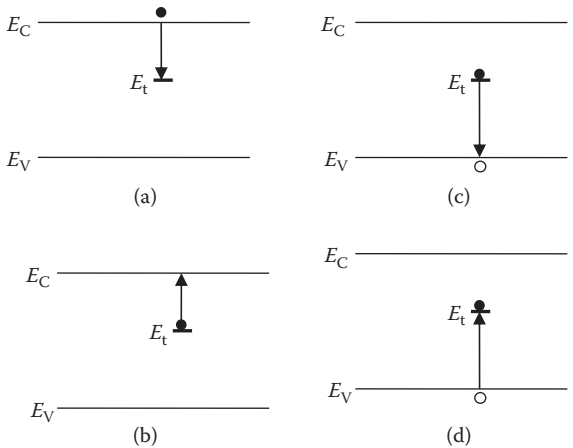

FIGURE 2.13
Four basic processes of the indirect recombination process with the help of trapping level (E_t). (a) Electron capture, (b) electron release, (c) hole capture, and (d) hole release.

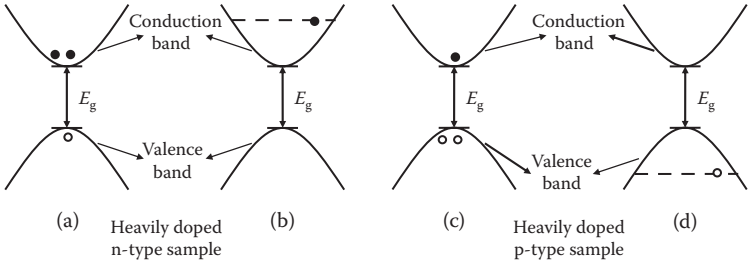

FIGURE 2.14
The e-e-h process (a) before recombination and (b) after recombination; and the h-h-e process (c) before recombination and (d) after recombination.

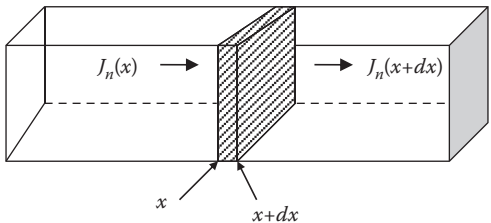

FIGURE 2.15
A semiconductor bar with cross-sectional area A.

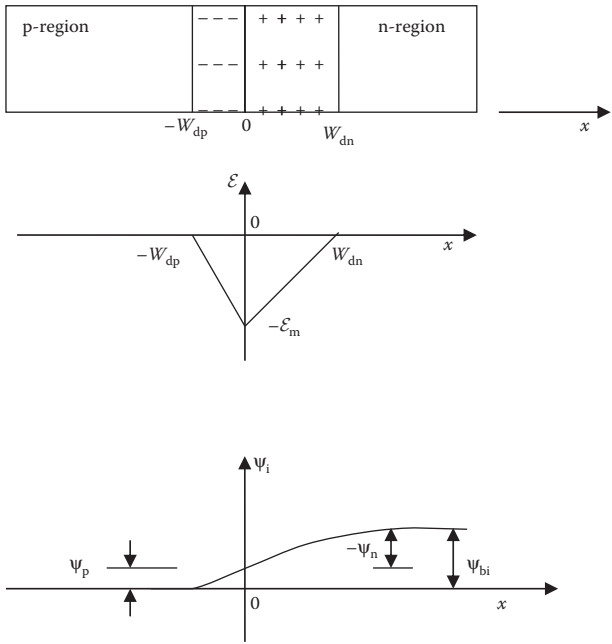

FIGURE 2.16
Potentials and fields in an abrupt junction.

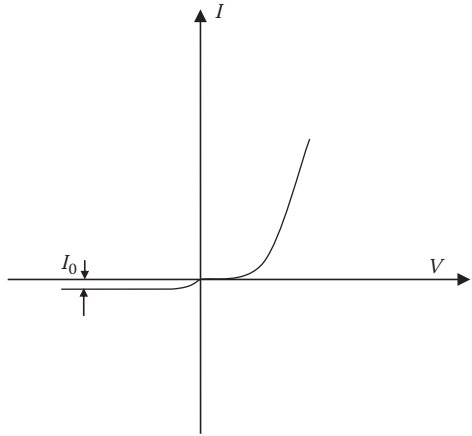

FIGURE 2.17
Current–voltage characteristic curve of a p-n junction.

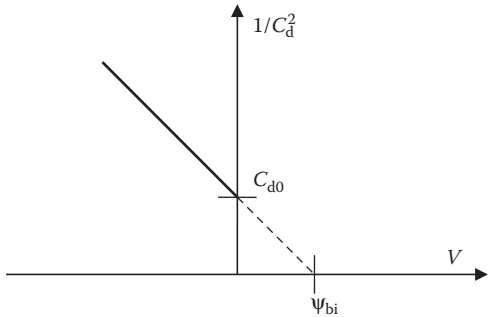

FIGURE 2.18
C-V characteristic curve for a reverse biased p-n junction.