**Table A.1.**
**Room temperature properties of silicon, germanium, and gallium arsenide**

| | Si | Ge | GaAs |
|---|---|---|---|
| $\Delta E_g$(eV) | 1.124 | 0.67 | 1.42 |
| $n_i$ (cm$^{-3}$) | $1.08 \times 10^{10}$ | $2.4 \times 10^{13}$ | $9 \times 10^{6}$ |
| $\mu_e$ (cm$^2$/V · s) | 1500 | 3900 | 8500 |
| $\mu_h$ (cm$^2$/V · s) | 600 | 1900 | 400 |
| $\varepsilon_r$ ($\varepsilon/\varepsilon_0$) | 11.7 | 15.8 | 13.1 |

adapted from Fonstad, Microelectronic Devices and Circuits, 1994.

**Table A.2**
**Properties at room temperature (300 K) of some representative elemental and compound semiconductors.**

| | Lattice | | Energy Gap | | Mobilities | |
|---|---|---|---|---|---|---|
| | Period (Å) | Type | Size ($\Delta E_g$) | Type | $\mu_e$(cm$^2$/V · s) | $\mu_h$(cm$^2$/V · s) |
| C | 3.57 | d | 5.5 | d | 2000 | 2100 |
| Si | 5.43 | d | 1.124 | i | 1500 | 500 |
| Ge | 5.64 | d | 0.67 | i | 3900 | 1900 |
| a-Sn | 6.49 | d | ≈ 0.08 | d | 2500 | 2400 |
| AlP | 5.46 | z | 2.43 | i | 80 | |
| AlAs | 5.66 | z | 2.17 | i | 1000 | 180 |
| AlSb | 6.13 | z | 1.58 | i | 200 | 420 |
| GaP | 5.4 | z | 2.26 | i | 300 | 150 |
| GaAs | 5.65 | z | 1.42 | d | 8500 | 400 |
| GaSb | 6.09 | z | 0.72 | d | 4600 | 850 |
| InP | 5.86 | z | 1.35 | d | 4000 | 600 |
| InAs | 6.05 | z | 0.36 | d | 33,000 | 200 |
| InSb | 6.47 | z | 0.17 | d | 80,000 | 1700 |
| ZnS | 5.42 | z | 3.68 | d | 165 | 5 |
| ZnSe | 5.67 | z | 2.70 | d | 500 | 30 |
| ZnTe | 6.10 | z | 2.26 | d | 340 | 50 |
| CdS | | w | 2.42 | d | 250 | |
| CdSe | | w | 1.73 | d | 650 | |
| CdTe | 6.48 | z | 1.56 | d | 1050 | 100 |

The abbreviations used are, in the lattice type column: d—diamond, z—zinc blende, w—wurtzite (hexagonal); and in the energy gap type column: d—direct, i—indirect.

adapted from Fonstad, Microelectronic Devices and Circuits, 1994.

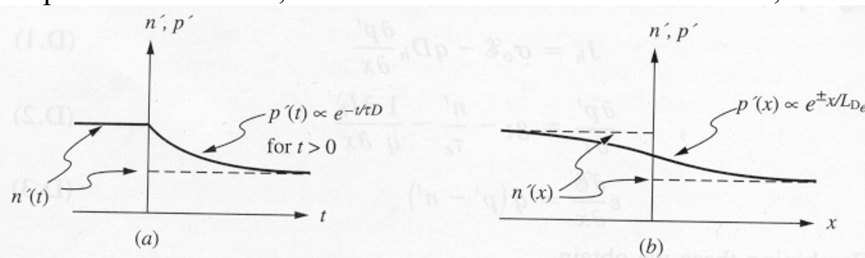


**FIGURE D.1**
Variations of the excess majority carrier concentration $p'(x)$ (solid curve) in response to a hypothetical temporal or spatial step change, respectively, in the minority carrier concentration $n'(x)$ (dashed curve): (*a*) temporal; (*b*) spatial.

adapted from Fonstad, Microelectronic Devices and Circuits, 1994.

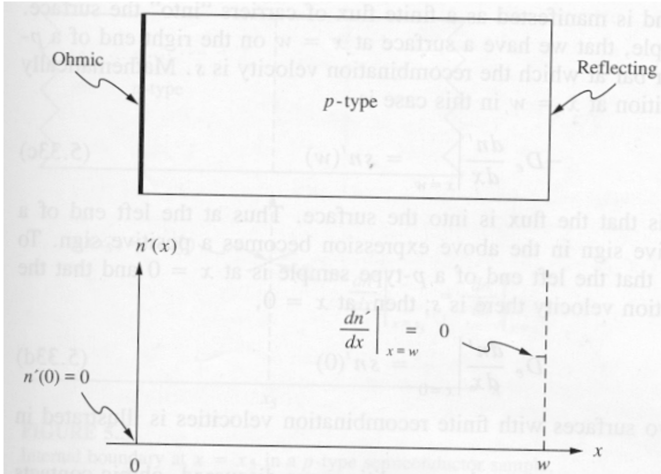


**FIGURE 5.1**
A $p$-type semiconductor sample with an ohmic contact on the end at $x = 0$ and a reflecting boundary on the end at $x = w$.

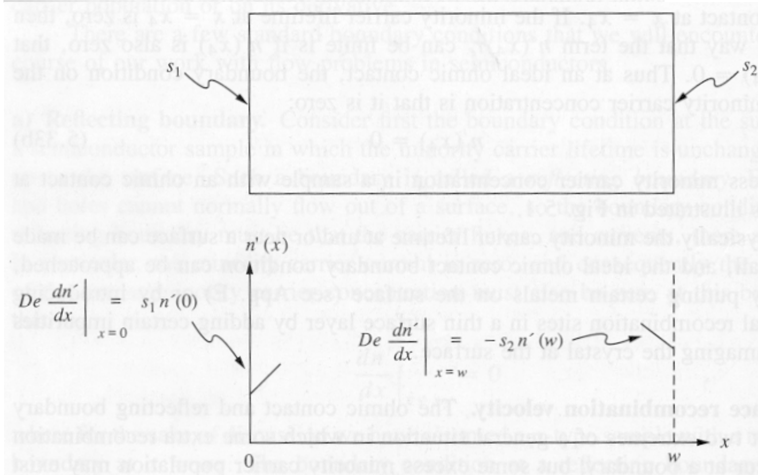


**FIGURE 5.2**
A $p$-type semiconductor sample with surface recombination velocities of $s_1$ and $s_2$ on the end surfaces at $x = 0$ and $x = w$, respectively.

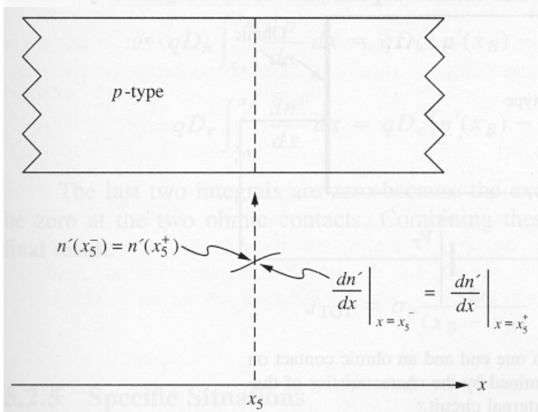


**FIGURE 5.3**
Internal boundary at $x = x_5$ in a $p$-type semiconductor sample, illustrating the continuity of the excess minority carrier concentration and its derivative.

adapted from Fonstad, Microelectronic Devices and Circuits, 1994.