Fundamentals of Nanoelectronics, II: Energy Band Model

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L2.10 Quiz

Answers

2.10. Summing up ..

2.10a. The measured conductivity σ_0 can be calculated from the energy-dependent function $\sigma(E)$ using the relation

(a) $\int_{-\infty}^{+\infty} dE\, \sigma(E) \frac{1 - f_0(E)}{kT}$

(b) $\int_{-\infty}^{+\infty} dE\, \sigma(E) \frac{f_0(E)}{kT}$

(c) $\int_{-\infty}^{+\infty} dE\, \sigma(E) \frac{1 + f_0(E)}{kT}$

(d) $\int_{-\infty}^{+\infty} dE\, \sigma(E) \left(- \frac{\partial f_0(E)}{\partial E} \right)$

(e) None of the above

2.10b.

$$U = U_0(N - N_0) + \beta(-qV_G) + \alpha(-qV) \qquad \textbf{(A)}$$

$$N = \int_{-\infty}^{+\infty} dE\, D(E - U)\, \frac{f_1(E) + f_2(E)}{2} \qquad \textbf{(B)}$$

$$I = \frac{1}{q} \int_{-\infty}^{+\infty} dE\, G(E - U)\, \big(f_1(E) - f_2(E) \big) \qquad \textbf{(C)}$$

It is claimed that two of these equations need to be solved self-consistently and once a self-consistent solution has been found, it could be used in the third equation. These two equations are

(a) A and B

(b) B and C

(c) A and C

(d) All three equations need to be solved simultaneously

(e) The three equations can each be solved independently