Fundamentals of Nanoelectronics, Basic Concepts Unit 4
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L4.2 Quiz
Answers

4.2. Seebeck Coefficient

We have seen that the current can be written in terms of voltage and temperature differences in the form $I = G_0 \Delta V + G_S \Delta T$

Where

$$G_0 = \int_{-\infty}^{+\infty} dE \left(-\frac{\partial f_0}{\partial E} \right) G(E)$$

$$G_S = \int_{-\infty}^{+\infty} dE \left(-\frac{\partial f_0}{\partial E} \right) \frac{E - \mu_0}{qT_0} G(E)$$

4.2a A device with the source hotter than the drain is left open-circuited so that current is ***zero***. Relative to the source, the drain will become

(a) Negative, always
(b) Positive, always
(c) Positive, if G(E) increases with increasing E around E=μ
(d) Negative, if G(E) increases with increasing E around E=μ
(e) none of the above, drain and source have the same potential.

4.2b The magnitude of the Seebeck coefficient S is given by

(a) $|S| = \frac{G_S}{G_0}$

(b) $|S| = G + G_S$

(c) $|S| = G - G_S$

(d) $|S| = G * G_S$

(e) S is unrelated to G and G_S