

Thermoelectricity: From Atoms to Systems

L4.5 Quiz

Answers

- 1) In a bipolar device such as diode, electrical current is composed of two components (electrons and holes). Thermoelectric effects in a bipolar device:
- a. are always smaller than that in a unipolar device.
 - b. can give rise to internal cooling at the p-n junction.
 - c. can increase the efficiency of light emission from p-n junction.
 - d. all of above.
 - e. Answers b and c.
- 2) A voltage V is applied across a thermionic cooler whose length is on the order of the carrier mean free path. The current is equal to I . The amount of Joule heating that goes to the cathode side is ...
- a. Zero
 - b. Equal to $\frac{1}{2}IV$
 - c. Equal to IV
 - d. Less than $\frac{1}{2}IV$
 - e. Larger than $\frac{1}{2}IV$, but less than IV
- 3) Which of the following statements is NOT true about the non-linear Peltier effect?
- a. The Peltier effect becomes nonlinear when the carrier temperature exceeds the lattice temperature due to strong field.
 - b. The non-linear Peltier coefficient is proportional to the current density squared
 - c. The non-linearity of the Peltier coefficient decreases with increasing carrier density.
 - d. The non-linear Peltier coefficient is independent of lattice temperature.
 - e. None of the above