ANSWERS: Quiz: Week 2 Lecture 3
Thermoelectrics from Atoms to Systems
Mark Lundstrom, nanoHUB-U Fall 2013

Answer the **five questions** below by choosing the **one, best answer**.

1) Which of the following expressions for the thermoelectric figure of merit, *Z,* is correct?

a) $Z = S^2 s / k_{TOT}$.
b) $Z = S^2 / \left(r k_{TOT} \right)$.
c) $Z = Sps / \left(T k_{TOT} \right)$.
d) All of the above.
e) None of the above.

2) What is the thermoelectric "power factor"?

a) The quantity, Ss.
b) The quantity, $S^2 s$.
c) The quantity, $S^2 s T$.
d) The quantity, Sps.
e) The quantity, k_0 / k_L.

3) What location of the Fermi level maximizes the power factor for a p-type material?

a) The Fermi level should be well above the conduction band edge.
b) The Fermi level should be near the conduction band edge.
c) The Fermi level should be near the middle of the bandgap.
d) The Fermi level should be near the valence band edge.
e) The Fermi level should be well below the valence band edge.

4) What is the primary difference between a good thermoelectric material like Bi_2Te_3 and a poor thermoelectric material like Si?

a) Bi_2Te_3 has a much higher Seebeck coefficient.
b) Bi_2Te_3 has a much higher electrical conductivity.
c) Bi_2Te_3 has a much higher Peltier coefficient.
d) Bi_2Te_3 has a much lower electronic thermal conductivity.
e) Bi_2Te_3 has a much lower lattice thermal conductivity.

(continued on next page)

Quiz: Week 2 Lecture 3 (continued)

5) How are the n-type and p-type legs of a thermoelectric cooler hooked up?

a) They are electrically in series and thermally in series.
b) They are electrically in series and thermally in parallel.
c) They are electrically in parallel and thermally in series.
d) They are electrically in parallel and thermally in parallel.
e) They are electrically in open and thermally in parallel.

End of quiz. This quiz contains 5 questions.