Week 5 Lecture 10 Quiz:
Phonon Scattering: Part III

ECE 656: Electronic Conduction In Semiconductors

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Purdue University, Fall 2013

Student's name: _____

Answer the **multiple choice questions** below by choosing the **one, best answer**. Then **ask a question** about the lecture.

1) Emission is proportional to the number of phonons and absorption to the number plus one. Why?
   a) To account for the zero point energy of the harmonic oscillator.
   b) To ensure that detailed balance is satisfied in equilibrium.
   c) To ensure that energetic carriers relax to the lowest energy states.
   d) Answers (a) and (b) above.
   e) Answers (b) and (c) above.

2) The scattering rate and the momentum relaxation rate are equal for which of the following cases?
   a) ADP, II, and ODP scattering.
   b) ADP, ODP, and POP scattering.
   c) POP, IV, ADP and ODP scattering.
   d) ADP, ODP, IV, and POP scattering.
   e) ADP, ODP, and IV scattering.

3) Which of the following scattering mechanisms favor small angle scattering?

   a) ADP and II.
   b) ODP and II.
   c) IV and II.
   d) POP and II.
   e) II.

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4) Electron-electron scattering is usually ignored when analyzing semiconductor devices. How is this justified?

a) Because it is typically weak compared to charged impurity and phonon scattering.
b) Because it conserves the momentum of the electron ensemble.
c) Because it conserves the energy of the electron ensemble.
d) Because it conserves the number of electrons.
e) Because it is just to difficult to compute.

5) Consider the II-VI semiconductor, ZnSe. What do you expect the dominant scattering mechanism to be if it is undoped and at room temperature?
a) ADP scattering.
b) ODP scattering.
c) PZ scattering.
d) POP scattering.
e) IV scattering.

6) What question do you have about this lecture?

Turn in to Prof. Lundstrom in class on Friday.