

ECE 59500: Spring 2019  
Theory and Practice of Solar Cells: A Cell to System Perspective

**Lecture 3 Quiz:**

- 1) What is the primary advantage of a dual layer anti-reflection coating as compared to a single layer AR coat?
  - a) Lower minimum reflection
  - b) Broader bandwidth of low reflection
  - c) Lower manufacturing costs
  - d) Better suited to texturized surfaces
  - e) Better reliability
  
- 2) Why do direct gap semiconductors have a higher absorption coefficient than indirect gap semiconductors?
  - a) Because they have lower electron effective mass
  - b) Because they have higher electron effective mass
  - c) Because they have lower hole effective mass
  - d) Because they have higher electron effective mass
  - e) Because absorption process does not involve a phonon
  
- 3) What is the “Yablanovitch limit”.
  - a) The theoretical upper limit to the open-circuit voltage
  - b) The theoretical upper limit to the short-circuit current
  - c) The theoretical upper limit to the fill factor
  - d) The theoretical upper limit for the enhancement of optical absorption with perfect texturizing
  - e) The theoretical upper limit efficiency of a solar cell with a given bandgap

(OVER)

ECE 59500 Lecture 3 Quiz (continued)

4) Which of the following is the correct hole continuity equation?

a)  $\frac{\partial p}{\partial t} = \nabla \cdot (\bar{J}_p / q) + G + R$

b)  $\frac{\partial p}{\partial t} = \nabla \cdot (\bar{J}_p / q) + G - R$

c)  $\frac{\partial p}{\partial t} = -\nabla \cdot (\bar{J}_p / q) + G + R$

d)  $\frac{\partial p}{\partial t} = -\nabla \cdot (\bar{J}_p / q) - G + R$

e)  $\frac{\partial p}{\partial t} = -\nabla \cdot (\bar{J}_p / q) + G - R$

5) What does the condition “Recombination = Generation” determined?

- a) The short-circuit current
- b) The open-circuit voltage
- c) The maximum power point
- d) The collection efficiency
- e) The series resistance