

## Thermoelectricity: From Atoms to Systems

### L3.3 Quiz

#### Answers

- 1) What is the definition of the thermoreflectance coefficient  $C_{th}$ ? ( $R$  is the reflection coefficient,  $\Delta R$  is the variation of  $R$ ,  $T$  is the absolute temperature of the surface, and  $\Delta T$  is the temperature variation.)
- a.  $C_{th} = \frac{\Delta R}{\Delta T}$
  - b.  $C_{th} = \frac{1}{R} \frac{\Delta R}{\Delta T}$
  - c.  $C_{th} = \frac{\Delta R}{R}$
  - d.  $C_{th} = \frac{1}{T} \frac{\Delta T}{\Delta R}$
  - e.  $C_{th} = \frac{1}{T} \frac{\Delta R}{\Delta T}$
- 2) In a thermoelectric device, how one can separate Peltier heating from Joule heating in thermoreflectance images?
- a. Peltier heating is stronger than Joule heating.
  - b. Joule heating is stronger than Peltier heating.
  - c. Peltier signal appears at the same frequency as the excitation current while Joule signal is at twice the frequency.
  - d. Joule signal appears at the same frequency as the excitation current while Peltier signal is at twice the frequency.
  - e. It is not possible to separate the two signals.
- 3) How can a transient thermal response be measured using thermoreflectance imaging technique?
- a. By precisely varying the delay between the CCD exposure time and the sample excitation turn-on time
  - b. By precisely varying the delay between the illumination time and the CCD exposure time
  - c. By precisely varying the delay between the sample excitation turn-on time and the LED illumination time.
  - d. By precisely varying the delay between the sample excitation turn-on and turn-off times
  - e. None of the above
- 4) In Raman spectroscopy, temperature can be measured by
- a. Measuring the intensity of Stoke signal
  - b. Measuring the intensity of anti-Stoke signal
  - c. Measuring the ratio between the Stoke and anti-Stoke wavelength shifts
  - d. Measuring the ratio between the Stoke and anti-Stoke intensities
  - e. Measuring the ratio between the intensities of emitted light and illuminated light