Semiconductors/4th grade

Questions bank-Fall term 2022-2023

1. What is he most outstanding feature of semiconductors? Why are semiconductors used in manufacturing of electronic devices?
2. Draw figures to represent the atomic and band structures for metal and semiconductor. State the differences between them.
3. What are valance electrons? Represent by drawing for Si.
4. What is doping? Explain how to obtain p-type and n-type semiconductors with drawings.
5. What are the followings mean: **a.** Valence and conduction bands **b.** Bandgap **c.** Charge carriers **e.** Drift current **f.** Electron-hole recombination.
6. What are the three possible options for incident light on a semiconductor? What is the desired option and why? Write the formula that describes the intensity of incident light and define each parameter.
7. A semiconductor has an energy gap value of 3.37 eV. Determine the light wavelength need to be used to find the energy gap. If the semiconductor has a direct bandgap, can we use light wavelength of 500 nm to determine the band gap? Why? Find the absorption coefficient if the absorbance value of the semiconductor is 2.
8. What are intrinsic and extrinsic semiconductors?
9. Why silicon is important in solar cells?

10. Determine the hole drift velocity and mean free path for Si if the mean free time is 0.5×10^{-13} s and the applied electric field was 10^3 V/cm.
11. What is the mean free time? Does shorter free time is desired or longer free time? why?
12. What are the preparation techniques used to synthesis semiconductors? What the advantages of CBD.
13. What are the characterization techniques of semiconductors? Which technique are used to determine the band gap? Which technique is used to determine the structure of a semiconductor?
14. State three of semiconductors applications. Represent the process of producing electricity by solar cells.
15. Calculate light absorption depth for a semiconductor, knowing that the incident light intensity was **0.7** W/m^2, E_g = **3.12** eV, A= **0.5**.
16. What are the possible defects in semiconductors?
17. How can different LED colors be obtained? Explain.
18. What are the advantages and disadvantages for semiconductors preparation methods?
19. How to determine the electrical properties for a semiconductor? Explain.