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NPTEL

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Courses » Solid State Chemistry   Announcements   **Course**   Ask a Question   Progress   FAQ

Unit 16 - Week 12 : Theory of Electronic Structure of Solids, Part 2

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Certification exam**

Course outline

How to access the portal

Practice

Week 1 : Solid State And Solid State Materials

Week 2 Unit Cells And Lattices

Week 3 : Symmetry In Crystals Part 1

Week 4 : Symmetry in Crystals Part 2

Week 5 : Crystal Systems, Point Groups and Space Groups

Week 6 : Crystallographic Notations

Week 7 : Coordination number, voids, defects in

Assignment 12

The due date for submitting this assignment has passed.
As per our records you have not submitted this   **Due on 2019-04-24, 23:59 IST.**
assignment.

1) The difference between the crystal momentum and electron momentum is   ***1 point***

○ The crystal momentum has different units than the electron momentum

○ The crystal momentum refers to the momentum of the atoms in the crystal whereas the electron momentum refers to the momentum of the electrons in the crystal

○ The electron momentum is an eigenfunction of the momentum operator whereas the crystal momentum is not.

○ None of the others.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The electron momentum is an eigenfunction of the momentum operator whereas the crystal momentum not.

2) You are given the band structure of a crystal. Based on just the band structure, you can tell   ***1 point***
whether the material is a

○ conductor or not

○ conductor, insulator or semiconductor

○ a suitable material for LED applications

○ None of the other choices

No, the answer is incorrect.
Score: 0

Accepted Answers:
a suitable material for LED applications

3) The light absorption efficiency of a material is higher if its band gap is   ***1 point***

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Score: 0

Accepted Answers:
direct

4) Consider a cube shaped crystal of copper of side $1\mu m$. Assuming that each copper atom **1 point** contributes one valence electron to the bands, the interval between bands in each dimensions of the wavevector (i.e. k_x, k_y or k_z) is closet to (in units of $(A^\circ)^{-1}$)

○ 6

○ 0.06

○ 0.0006

○ 0.000006

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.0006

5) The material that is most commonly used for large scale solar applications is   **1 point**

○ Si

○ GaAs

○ GaN

○ Ge

No, the answer is incorrect.
Score: 0

Accepted Answers:
Si

6) Of the materials below, the most efficient one for solar applications is   **1 point**

○ Si

○ Ge

○ Al

○ GaAs

No, the answer is incorrect.
Score: 0

Accepted Answers:
GaAs

7) A certain material has a band gap of 2 eV. The light emitted by an LED formed using this   **1 point** material is closest to

○ red light

○ blue light

○ ultra-violet light

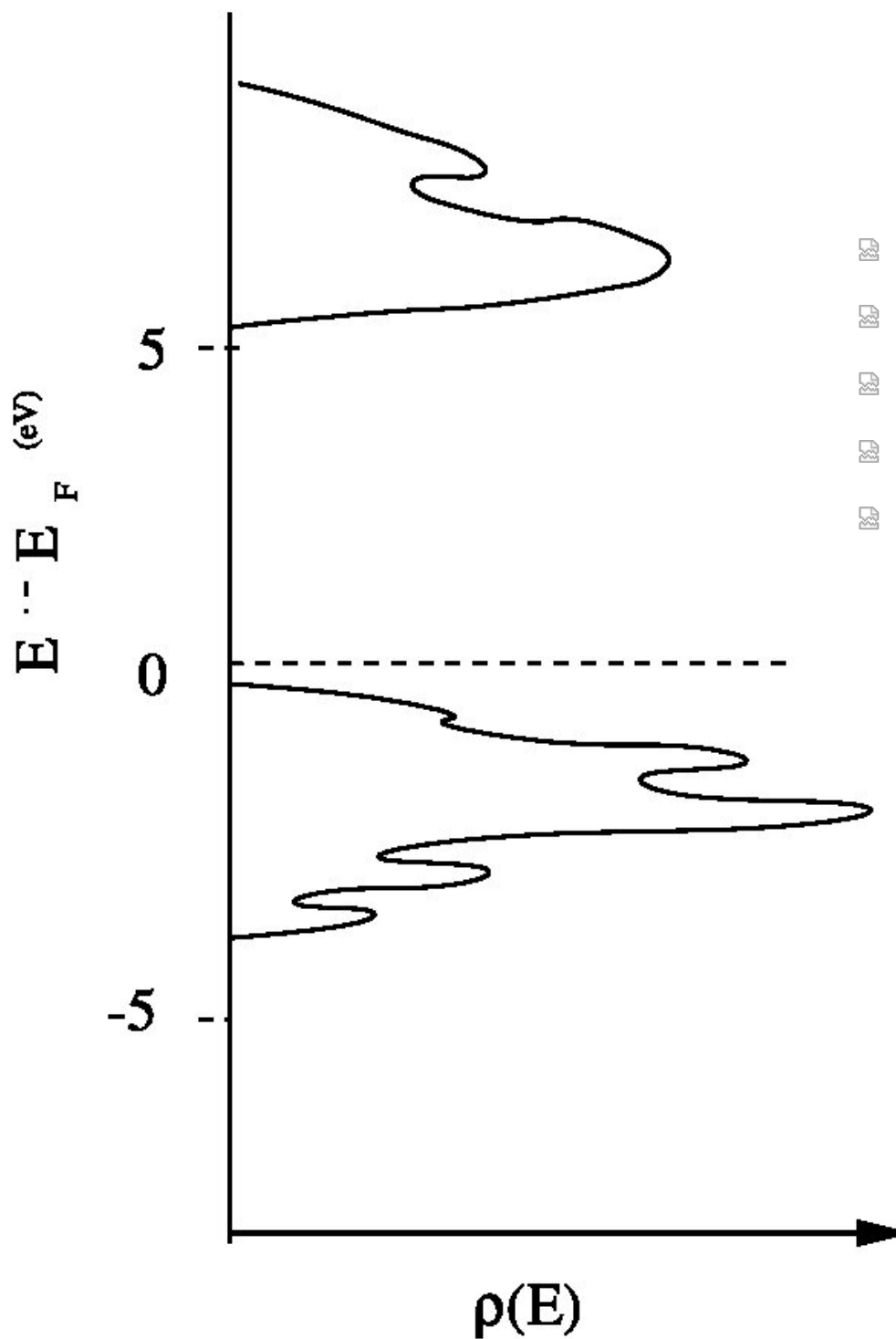○ infra-red light

No, the answer is incorrect.
Score: 0

Accepted Answers:
red light

8) Consider the density of states given below   **1 point**

The material is most likely to be

- ○ a conductor
- ○ an insulator
- ○ a semiconductor
- ○ not sure. There is not enough information to decide
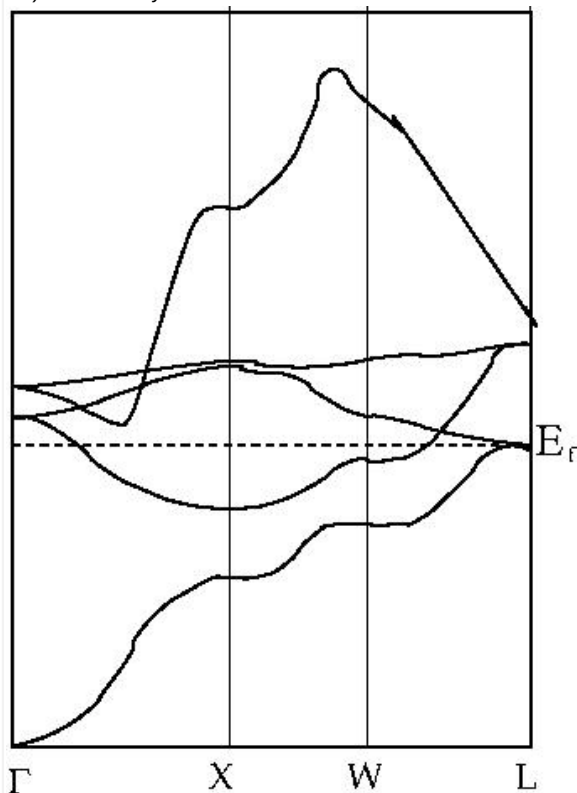
No, the answer is incorrect.
Score: 0

Accepted Answers:
an insulator

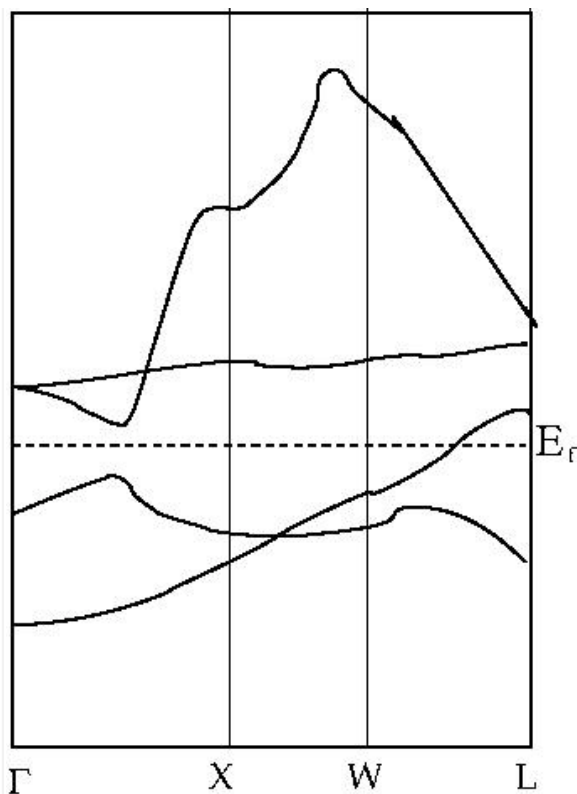9) A certain crystalline material has the band structure below   *1 point*

We can conclude that the material is likely to be

- ○ an insulator
- ○ a conductor
- ○ a semiconductor
- ○ None of the other choices

No, the answer is incorrect.
Score: 0

Accepted Answers:
a conductor

10) The band structure of a material is given below   *1 point*

Based on this band structure, there are two inferences.

A. The material may be suitable for LED applications

B. The material is a semiconductor

The correct inferences are

- ○ A but not B
- ○ B but not A
- ○ Both A and B
- ○ neither A nor B

No, the answer is incorrect.
Score: 0

Accepted Answers:
neither A nor B

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