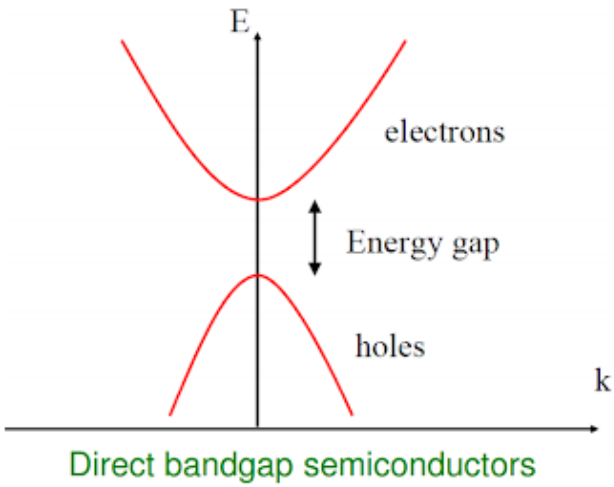
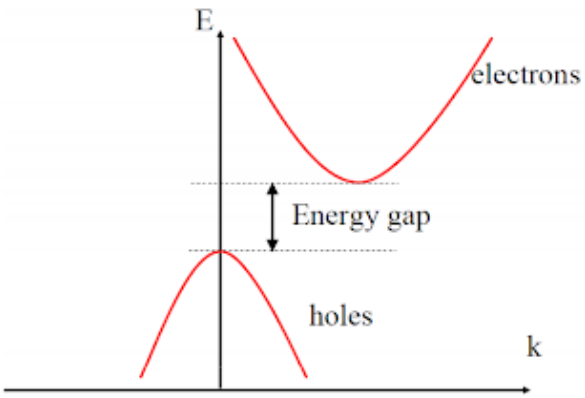
Differentiate between direct and indirect band gap semiconductors.

Direct band-gap (DBG) semiconductor	Indirect band-gap (IBG) semiconductor
A direct band-gap (DBG) semiconductor is one in which the maximum energy level of the valence band aligns with the minimum energy level of the conduction band with respect to momentum. In a DBG semiconductor, a direct recombination takes place with the release of the energy equal to the energy difference between the recombining particles. The probability of a radiative recombination is high. The efficiency factor of a DBG semiconductor is higher. Thus, DBG semiconductors are always preferred over IBG for making optical sources. Example, Gallium Arsenide (GaAs).	An Indirect band-gap (IBG) semiconductor is one in which the maximum energy level of the valence band and the minimum energy level of the conduction band are misaligned with respect to momentum. In case of a IBG semiconductor, due to a relative difference in the momentum, first, the momentum is conserved by release of energy and only after the both the momenta align themselves, a recombination occurs accompanied with the release of energy. The probability of a radiative recombination is comparatively low. The efficiency factor of a IBG semiconductor is lower. Example, Silicon and Germanium



Direct bandgap semiconductors



Indirect bandgap semiconductors

k=momentum

Link to video Lecture

https://www.youtube.com/watch?v=A56UtkYYExg