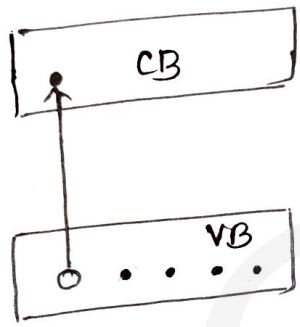
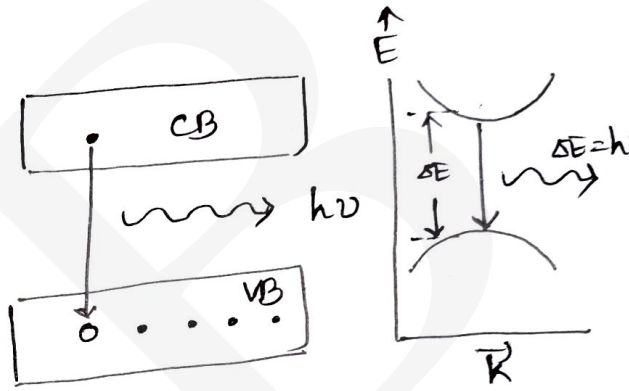
LIGHT EMITTING DIODE (LED)

It is a p-n junction diode which emits light when it is forward biased. It converts electric energy into light energy.

PRINCIPLE :

* LED works on the principle of <u>radiative</u> recombination of e^- - hole pair.

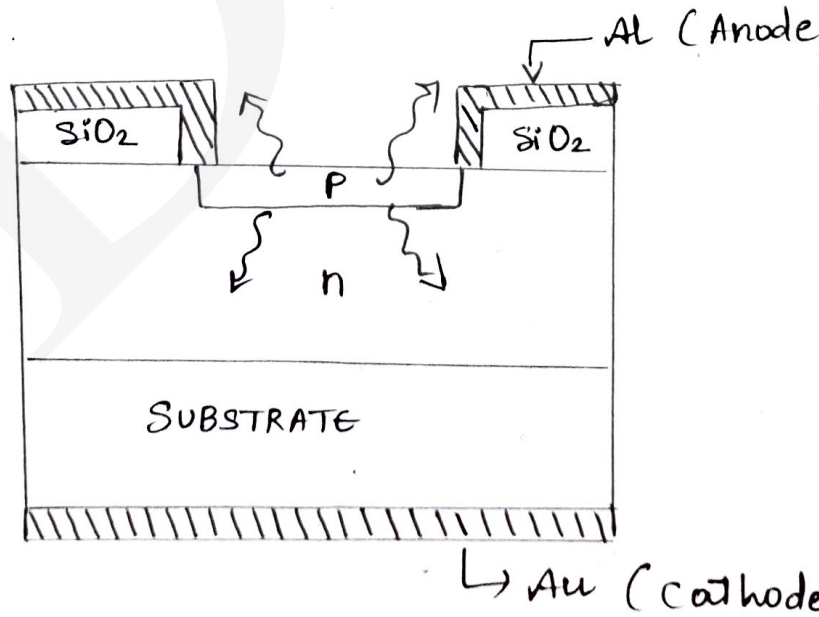




eg: GaAs or GaP

* In direct band gap material, the recombination of e^- & hole takes place by emitting a photon of energy equivalent to band gap energy.

CONSTRUCTION.



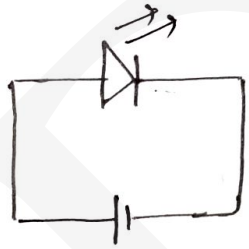
1. A suitable substrate is taken on which n type material is grown.

2. Using diffusion a thin p type region is grown over n type. n type region is heavily doped.

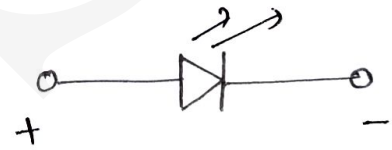
3. Anode contact is provided to the p type material layer using Al metal. And, below the substrate reflective coating of Au is deposited, which acts as cathode.

4. Insulation layer of SiO_2 is provided between anode & n type region.

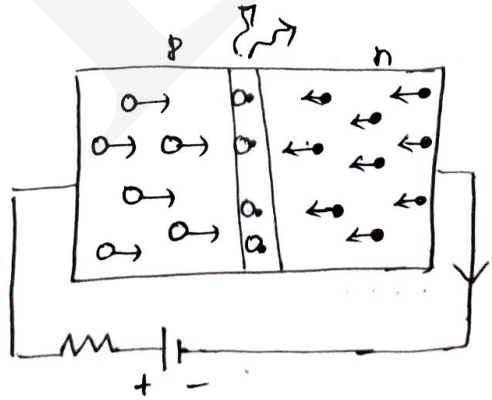
ckt diagram



symbol



WORKING



1. When an pn junction is formed slow diffusion of e^-s from n region to p region occurs till a depletion region is formed.

2. Once depletion region is formed, further diffusion is halted by built in potential.

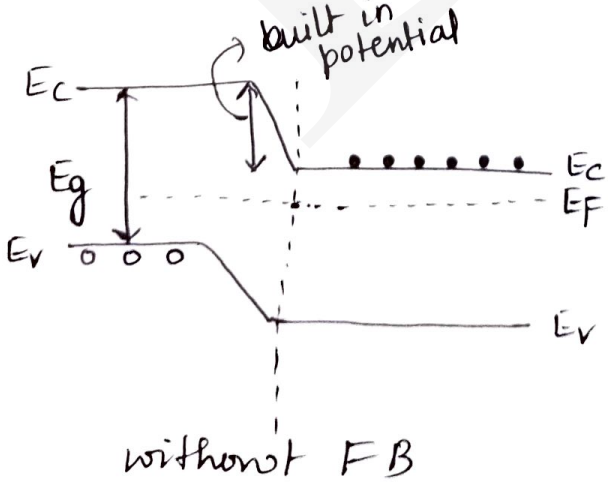
3. Once the junction is forward biased, built-in potential reduces, and e^- diffuses from n region to p region.

4. The recombination of injected e^-s in the depletion region as well as in the p side results in spontaneous emission of photons.

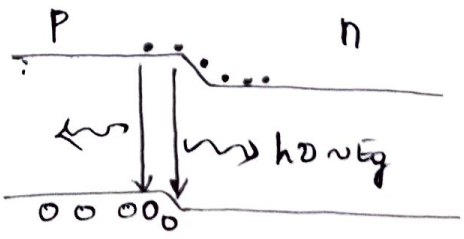
5. Recombination primarily occurs in depletion region & within a volume extending over the diffusion length of the e^-s in the p side.

6. Recombination zone is known as active region.

7. P side is kept sufficiently narrow so that emitted photons escape the device without being reabsorbed.



without FB



with FB