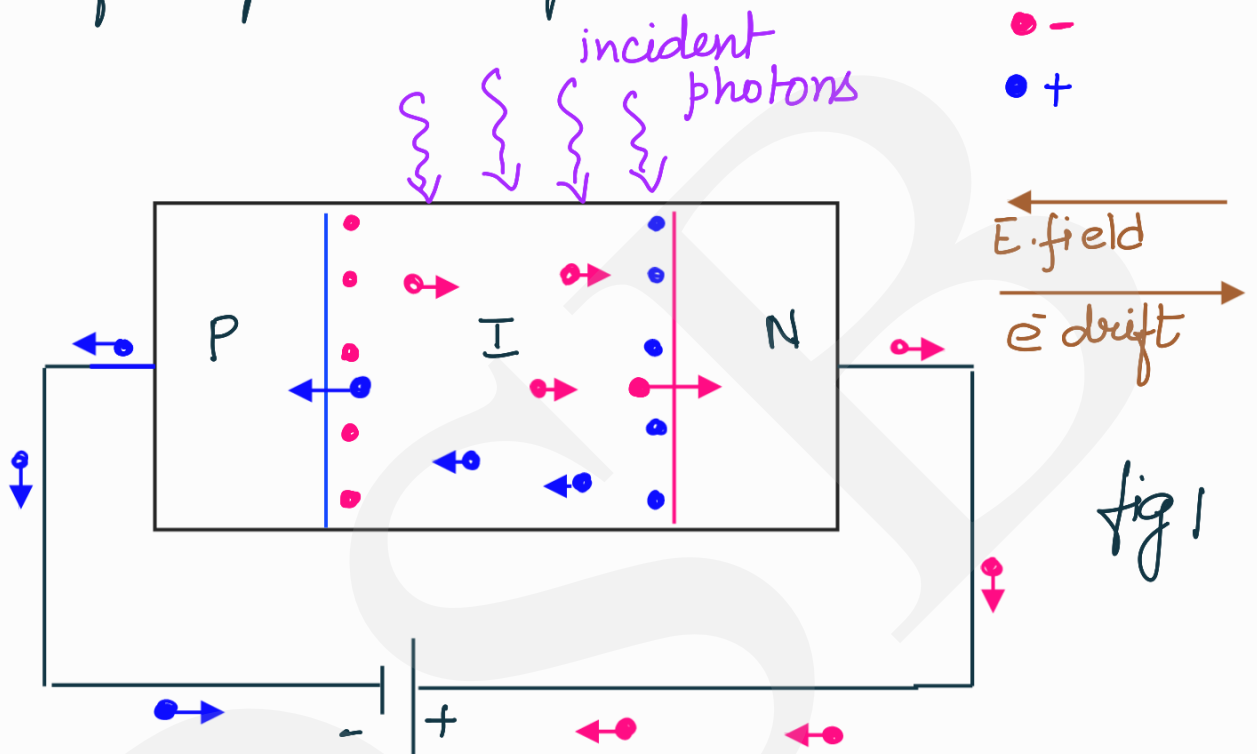


PIN photo diode

PIN photodiode is optical to electrical converter, consisting of intrinsic layer placed between P region and N region to increase the width of depletion region.



Principle

PIN photodiode works on the principle of internal photoelectric effect. When light is incident on the depletion region of a junction diode, e^- & hole pairs are produced, which contribute to photoconductivity.

Construction

1. Trailayer assembly of N type, Intrinsic & P type semiconductor is formed. (fig 2)

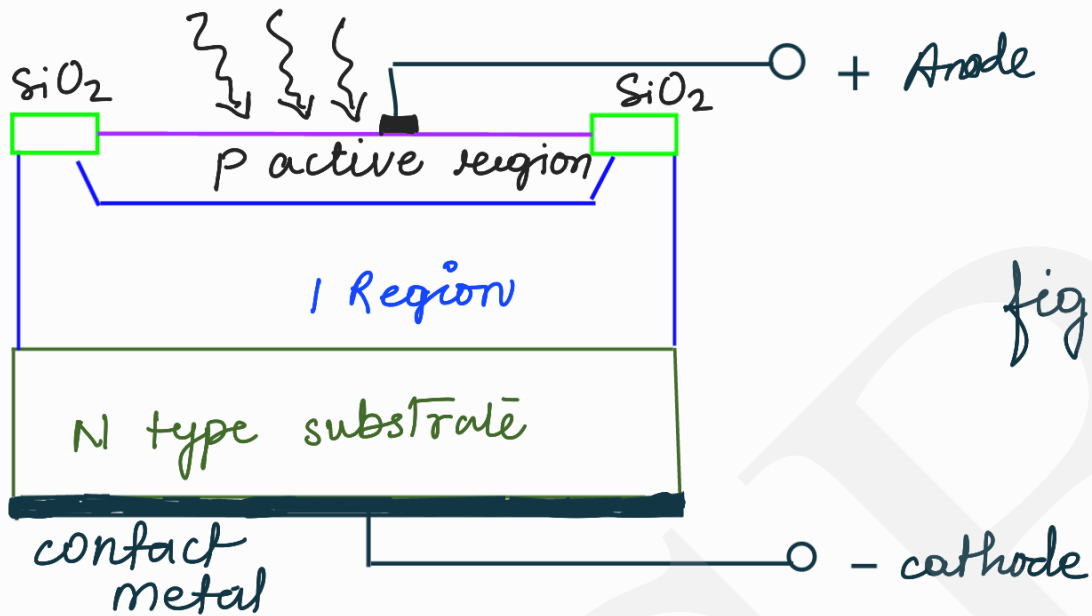


fig 2.

2. The electrons from N region & holes from P region diffuse into intrinsic region due to concentration gradient. The depletion region is formed.
3. The diode is reverse biased.

Working

1. Under reverse bias, strong electric field is developed within depletion region which drift the electrons to N region & holes to P region. Depletion region grows.

2. Once swept voltage is achieved, the intrinsic region is free of mobile charge carriers.
3. As photons are incident on depletion region they generate e^-h pair.
4. Electrons are drifted towards N region and hole towards P region before they recombine.
5. Electrons and holes are attracted towards positive & negative terminal of the battery respectively, and current flows.

Advantages

1. High frequency response. Its response time is in nanoseconds.
2. Wide bandwidth
3. High quantum efficiency.

Disadvantages

1. It requires large reverse bias for its operation which sometimes reduces the signal to noise ratio.

Applications

They are used for detection of laser pulses, in ultrafast switching circuits and in logic circuits.