

ORGANIC LIGHT EMITTING DIODE (OLED)

OLED is a solid state device made up of thin films of organic molecules that produce light with the application of electricity.

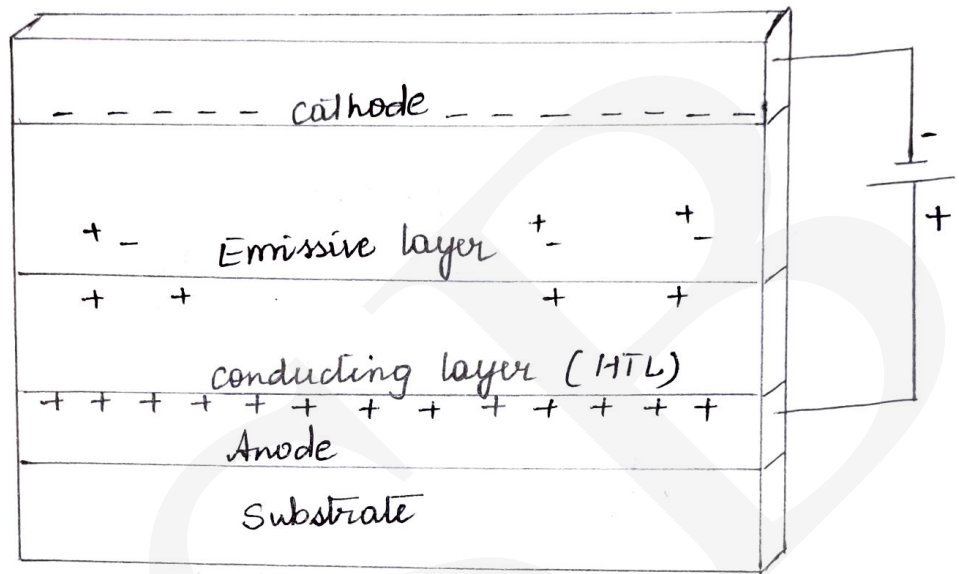
PRINCIPLE

They operate on the phenomenon of electroluminescence, caused due to radiative recombination of e^- & holes in organic film.

CONSTRUCTION

1. Suitable substrate of clear plastic or glass is taken to support OLED.
2. On top of substrate we have transparent anode which adds $\oplus$ holes (removes e^-) when current flows through the device.
3. On top of anode two organic layers are grown or deposited —
 - (i) conducting layer also called as hole transport layer (HTL). This is organic plastic molecule layer to transport hole from anode.
 - (ii) Emissive layer also known as e^- transporting & emitting layer. This is made of another organic plastic molecule layer that transport e^- from cathode & here the light is emitted.

4 Cathode, is the topmost layer which may or may not be transparent. The cathode injects e^- when current flows through the device.



WORKING

1. Voltage is applied across OLED.
2. Electrons are injected into the emissive layer through cathode.
3. Holes are supplied to the conducting layer through anode.
Conducting layer transports the holes and they recombine with e^- s in emissive layer. When recombination takes place, light is emitted from OLED.
4. The colour of light depends on the type of organic molecule in the emissive layer.

Advantages of OLED

1. Thin and flexible.
2. Do not require back lighting.
3. Larger field of view $\sim 170^\circ$.
4. Brighter than LED's.

Disadvantages of OLED

1. They have shorter lifetime.
2. Water can easily damage it.

Applications of OLED

1. Widely used in cell phones, digital camera etc.
2. They are used in automotive dash boards and backlight in cars.
3. Used as screens of OLED TV and wearable device.

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