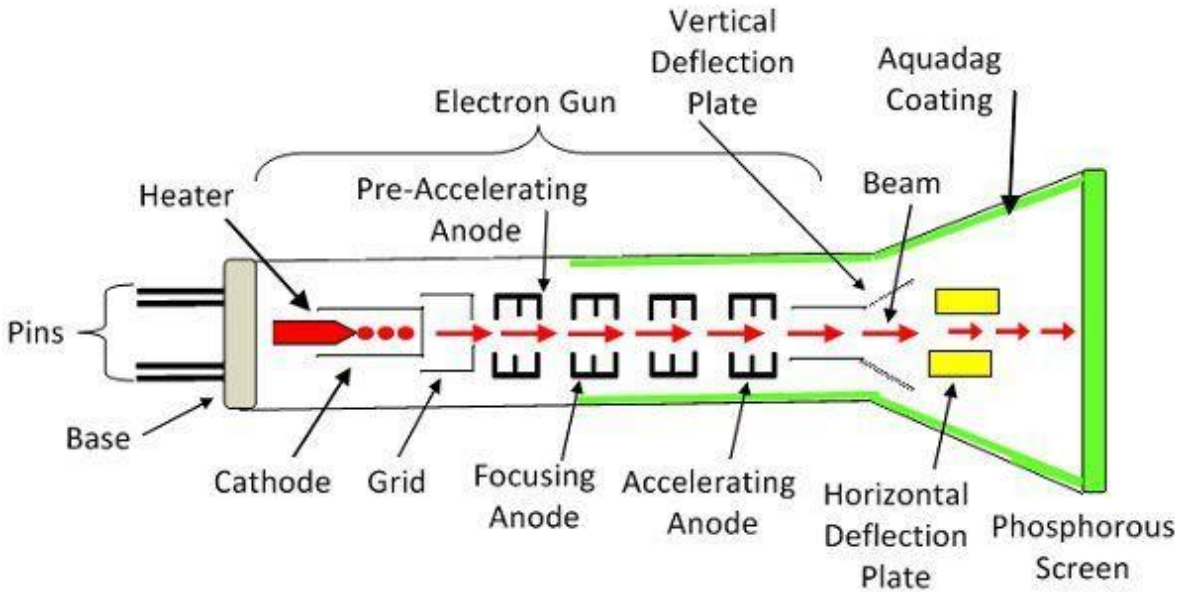
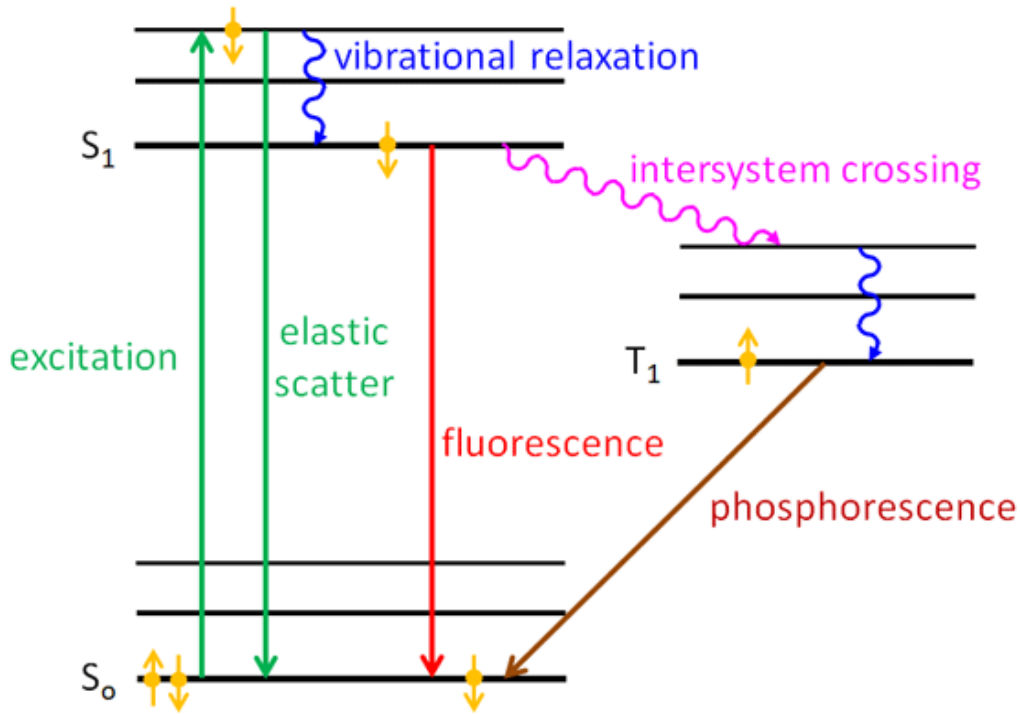
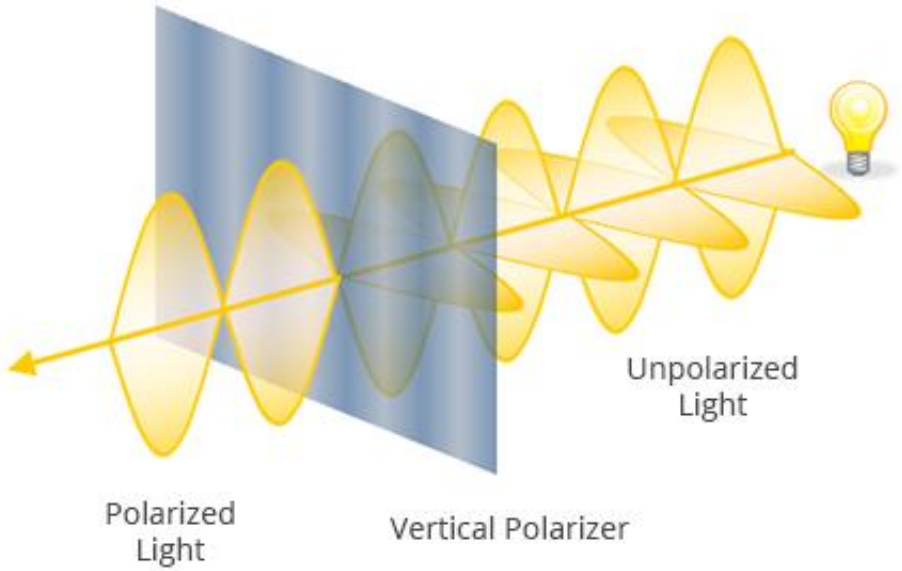
Displays

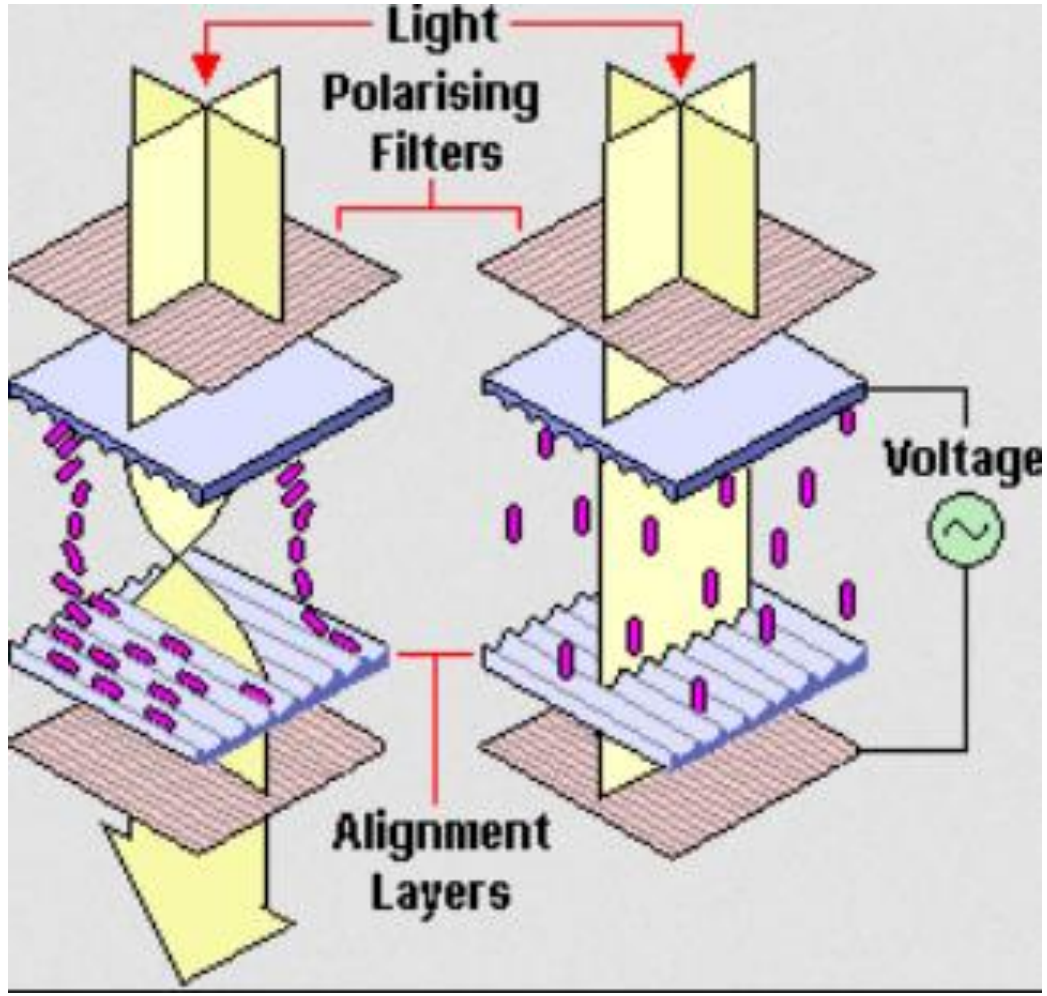
- A **computer monitor** is an output device which displays information in pictorial form. There are three types of monitors:
  - Cathode ray tube or **CRT monitors**, which uses a stream of high energy electrons hitting a fluorescent screen to form an image.
  - Liquid crystal display or **LCD monitors**, which uses polarized light passing through a liquid crystal layer to form an image.
  - Light-emitting diodes or **LED monitors**, which uses LEDS (!) to form an image

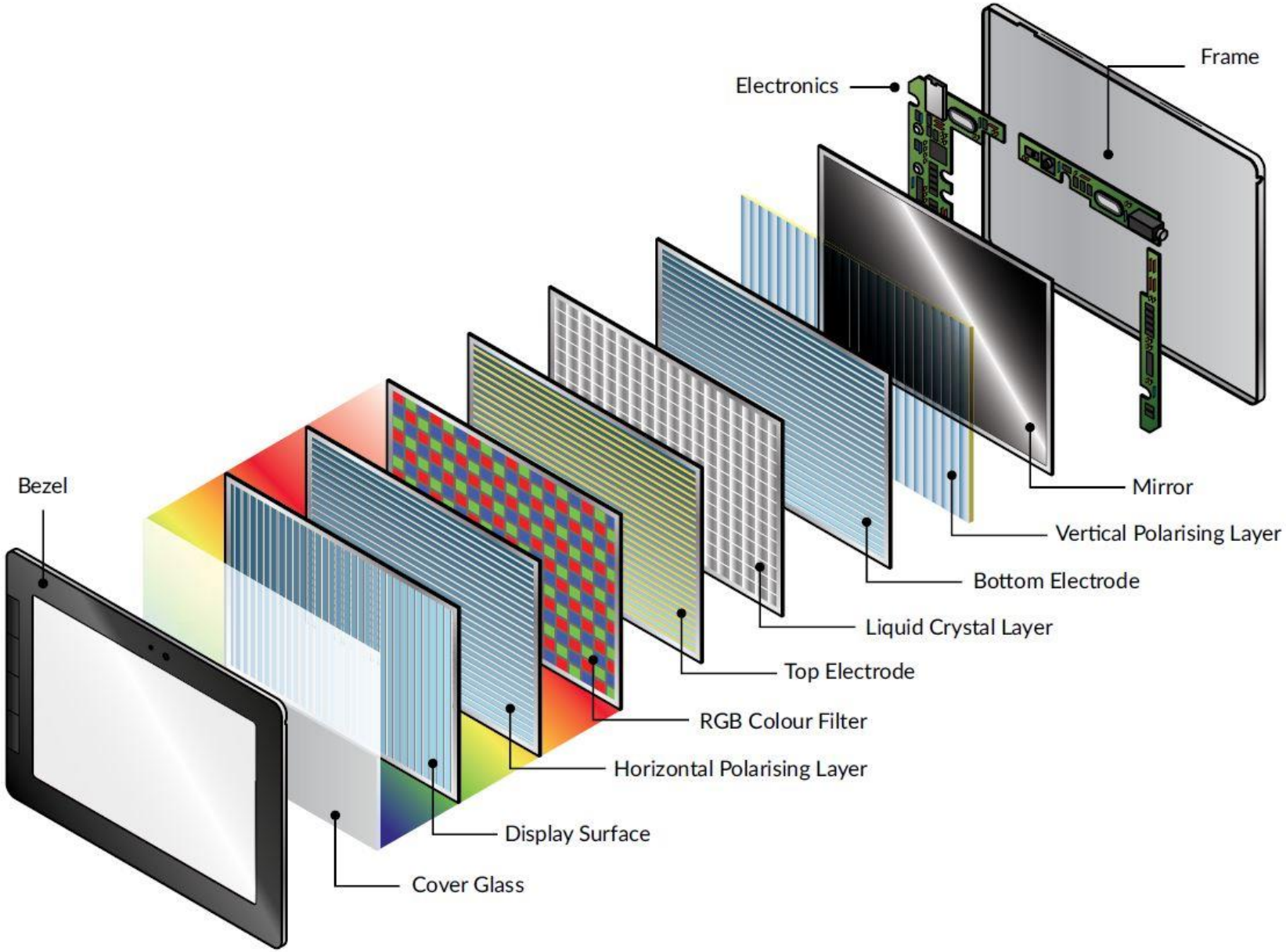


Cathode Ray Tube



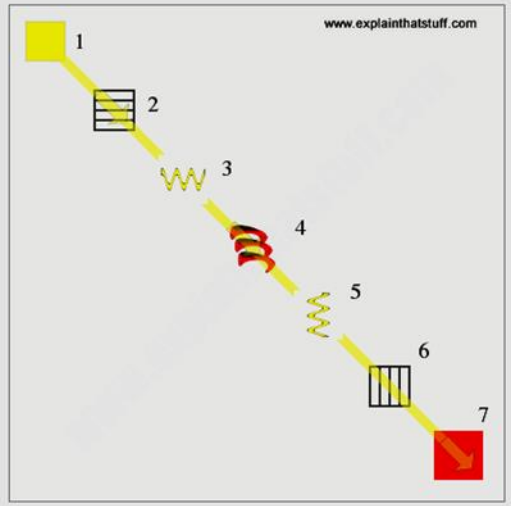

Unpolarized
Light
Polarized
Light
Vertical Polarizer


Light
Polarising
Filters
Voltage
Alignment
Layers


Frame
Electronics
Mirror
Vertical Polarising Layer
Bottom Electrode
Liquid Crystal Layer
Top Electrode
RGB Colour Filter
Horizontal Polarising Layer
Display Surface
Cover Glass
Bezel

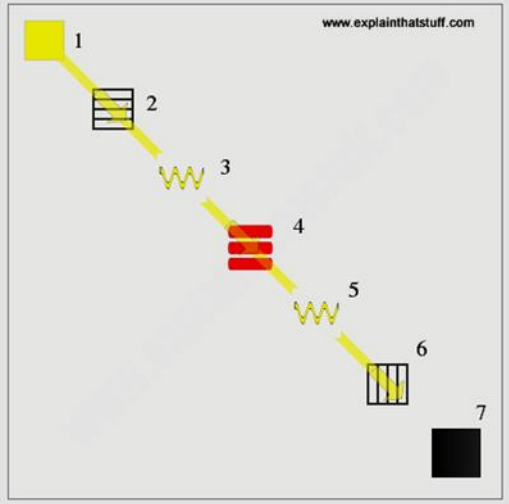
How pixels are switched on

1. The bright light at the back of the screen shines as before.
2. The horizontal polarizing filter in front of the light blocks out all light waves except those vibrating horizontally.
3. Only light waves vibrating horizontally can get through.
4. A transistor switches on this pixel by switching *off* the electricity flowing through its liquid crystals. That makes the crystals twist. The twisted crystals rotate light waves by 90° as they travel through.
5. Light waves that entered the liquid crystals vibrating horizontally emerge from them vibrating vertically.
6. The vertical polarizing filter in front of the liquid crystals blocks out all light waves except those vibrating vertically. The vertically vibrating light that emerged from the liquid crystals can now get through the vertical filter.
7. The pixel is lit up. A red, blue, or green filter gives the pixel its color.

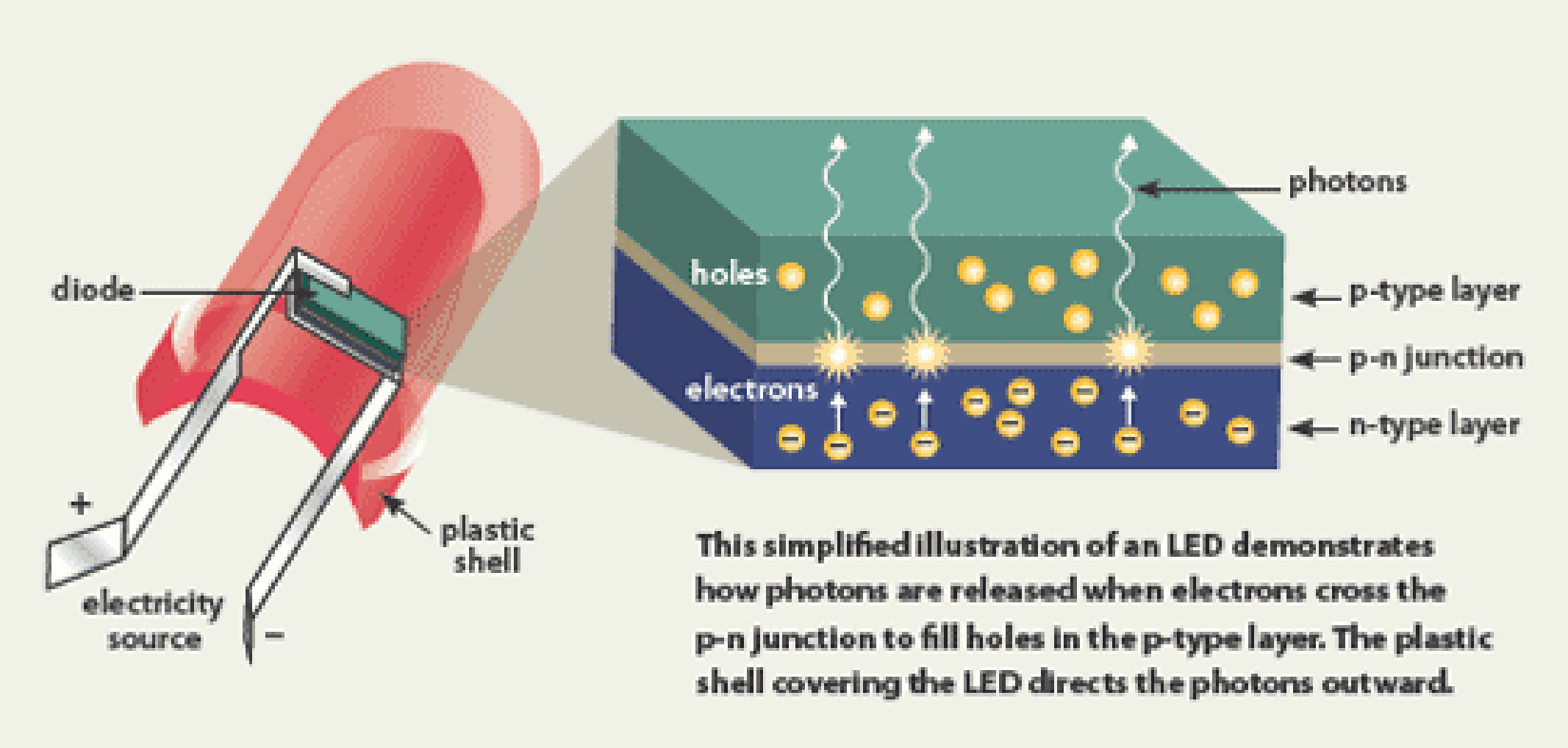


How pixels are switched off

1. Light travels from the back of the TV toward the front from a large bright light.
2. A horizontal polarizing filter in front of the light blocks out all light waves except those vibrating horizontally.
3. Only light waves vibrating horizontally can get through.
4. A transistor switches off this pixel by switching *on* the electricity flowing through its liquid crystals. That makes the crystals straighten out (so they're completely untwisted), and the light travels straight through them unchanged.
5. Light waves emerge from the liquid crystals still vibrating horizontally.
6. A vertical polarizing filter in front of the liquid crystals blocks out all light waves except those vibrating vertically. The horizontally vibrating light that travelled through the liquid crystals cannot get through the vertical filter.
7. No light reaches the screen at this point. In other words, this pixel is dark.



LED Monitor



This simplified illustration of an LED demonstrates how photons are released when electrons cross the p-n junction to fill holes in the p-type layer. The plastic shell covering the LED directs the photons outward.

THE CHEMISTRY OF LED LIGHTS

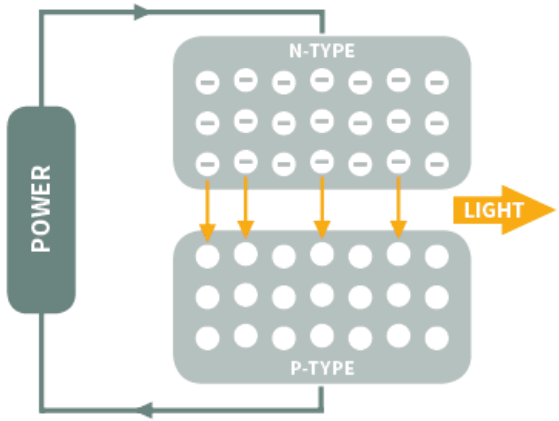
LED lights come in a full range of colours – this graphic takes a closer look at the chemistry behind how their light and varied hues are achieved.

RED	ORANGE	YELLOW	GREEN	BLUE	VIOLET
GaAsP	GaAsP	GaAsP	GaP	InGaN	InGaN
AlGaInP	AlGaInP	AlGaInP	GaN	AlGaN	AlGaN
GaP	GaP	GaP	InGaN	ZnSe	GaN

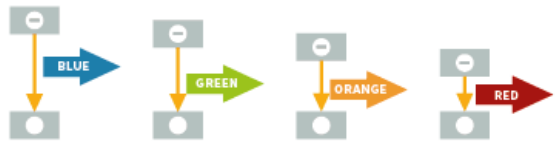
HOW DO LEDS WORK?

Light emitting diodes (LEDs) use semiconducting materials to produce light and colour. Many of the materials used are based on gallium, such as gallium phosphide (GaP) and gallium nitride (GaN).

Layers of the semiconductor are "doped" with impurities. This creates an n-type layer, which has electrons spare, and a p-type layer, which has electron "holes". When a current is applied, electrons from the n-type layer combine with the "holes" in the p-type layer. When the electrons fall into these holes, they release energy in the form of visible light.

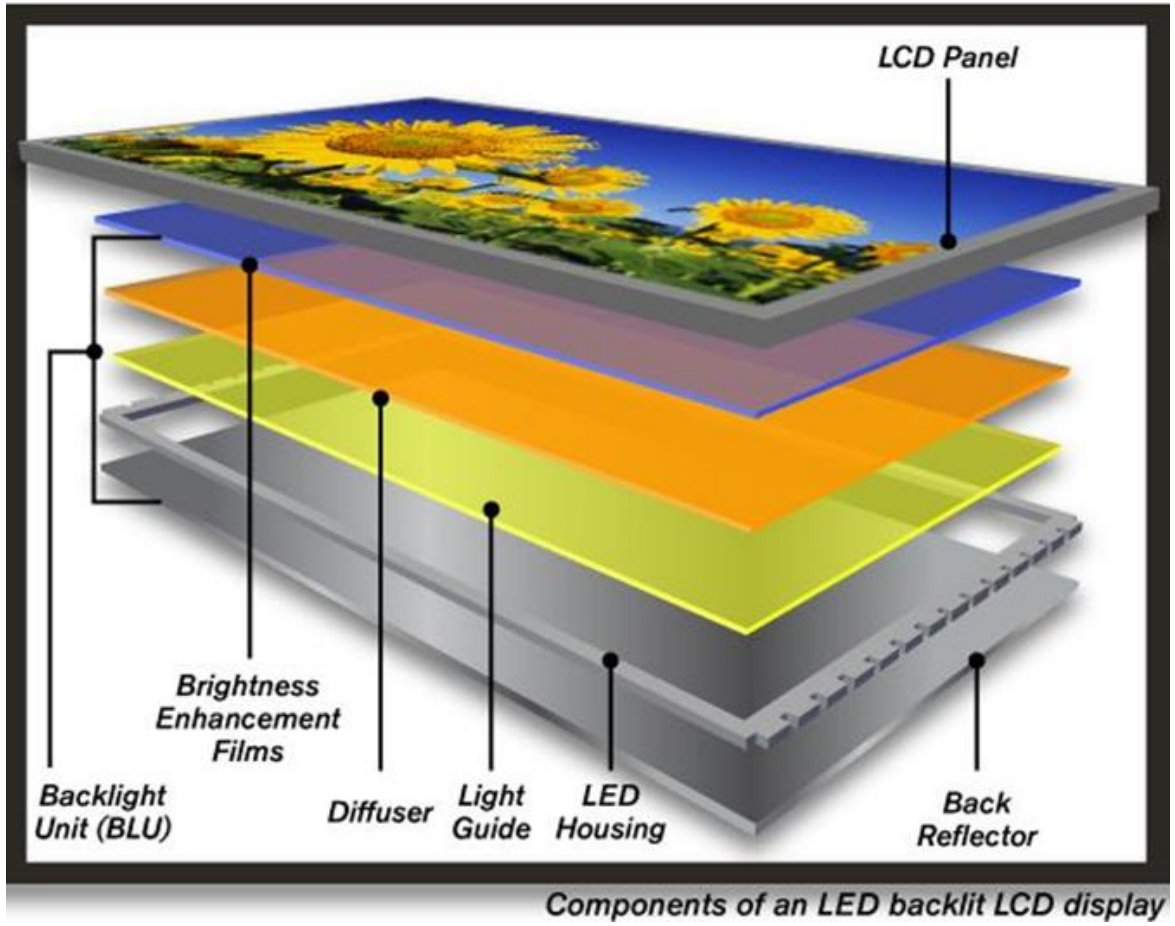


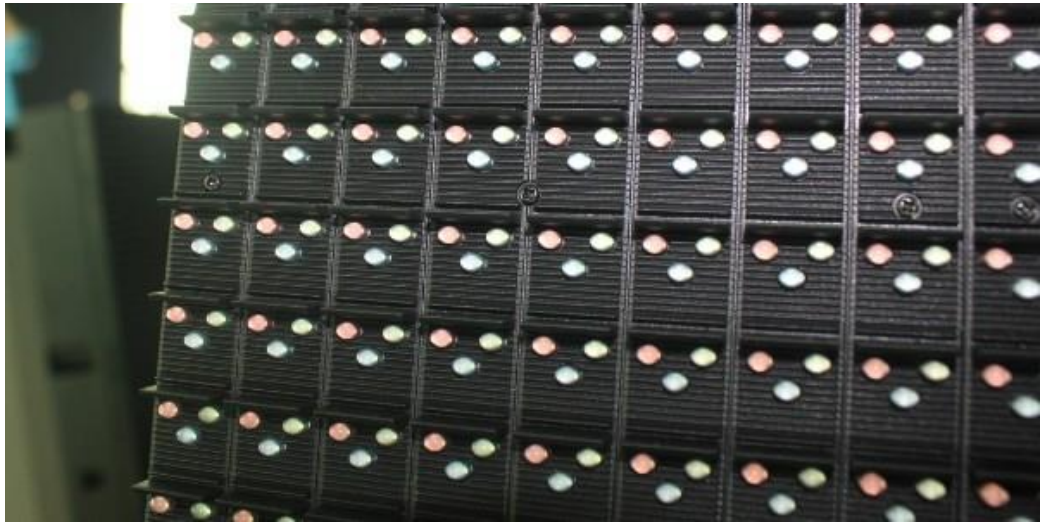
HOW ARE DIFFERENT COLOURS MADE?

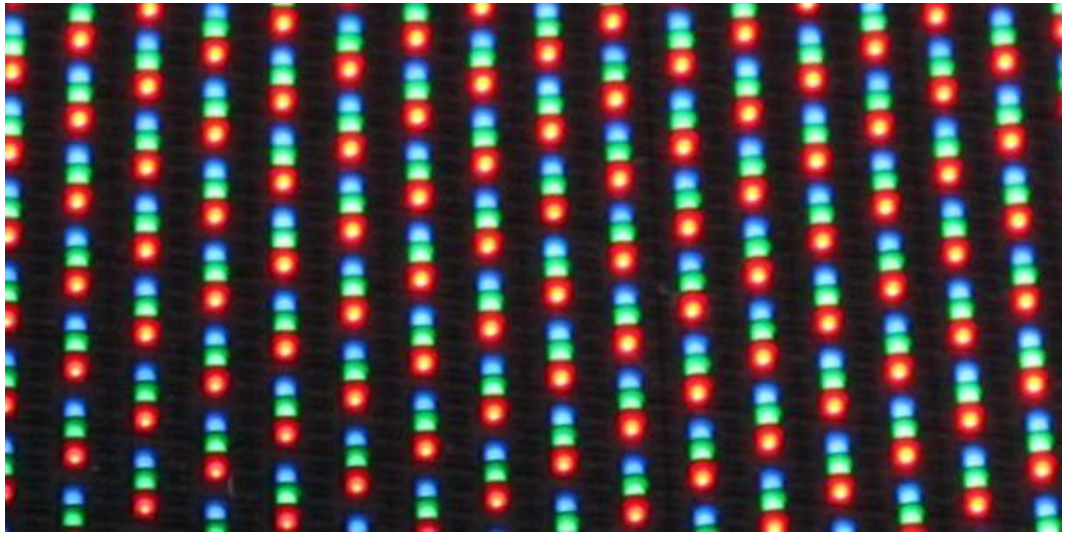


A variety of colours are made possible by the use of different semiconducting materials, and "doping" them with different types and amounts of impurities. This affects the energy gap between the n-type and p-type layers, affecting the wavelength of light produced when a current passes through the LED.

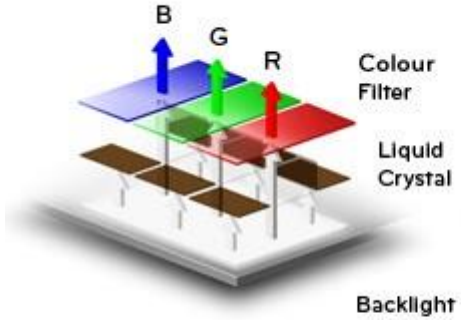
LED Monitor


LCD Panel
Brightness Enhancement Films
Backlight Unit (BLU)
Diffuser
Light Guide
LED Housing
Back Reflector
Components of an LED backlit LCD display



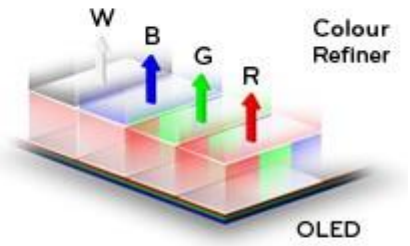


LED/LCD

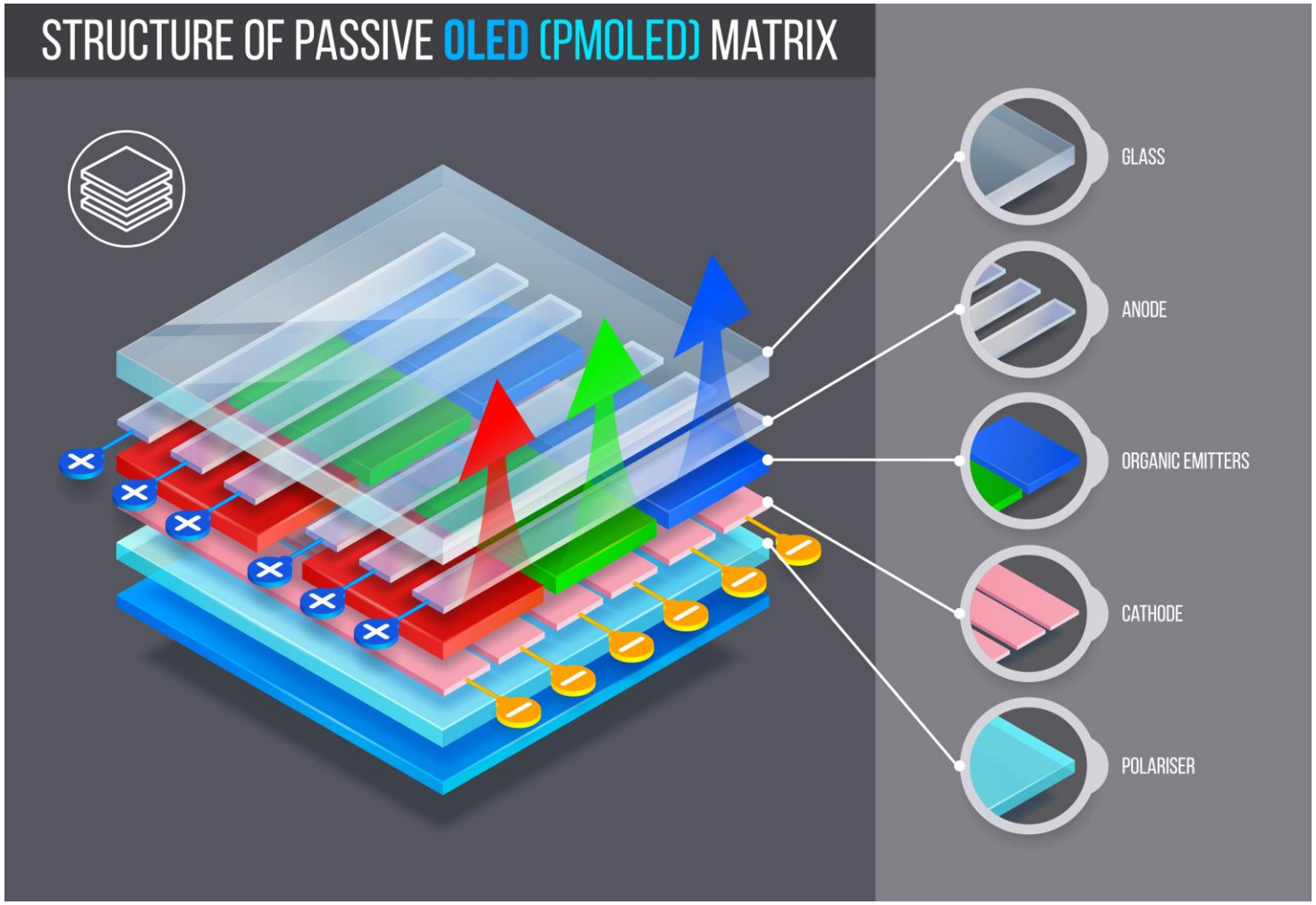


- Complex Structure
- BLU (Backlight Unit) CCFL, LED
- Lighting Unit = Pixel Unit

LG OLED



- Simple Structure
- Self-emissive
- Lighting Unit = Pixel Unit



OLED VERSUS AMOLED

OLED	AMOLED
OLED stands for Organic Light Emitting Diodes.	AMOLED is short for Active Matrix Organic Light Emitting Diodes.
It comprises of thin organic light-emitting materials that emit light when electricity is applied. Each pixel provides its own illuminating light.	It is basically an advanced version of OLED with an additional layer of thin-film transistor (TFTs) and a storage capacitor that maintains the line pixel states.
OLED displays are less flexible than AMOLED displays.	AMOLED displays are more flexible than OLED displays.
OLED displays are relatively less expensive than AMOLED displays.	AMOLEDs are a little expensive than OLED displays because of the active matrix technology.
OLEDs support large display sizes compared to conventional LCDs.	AMOLEDs work on the same fundamental principles of OLEDs but with literally no restrictions of display sizes.
Provides exceptional contrast ratio and consumes less power.	Provides higher contrast ratio but consumes more power while displaying brighter colors.

DifferenceBetween.net