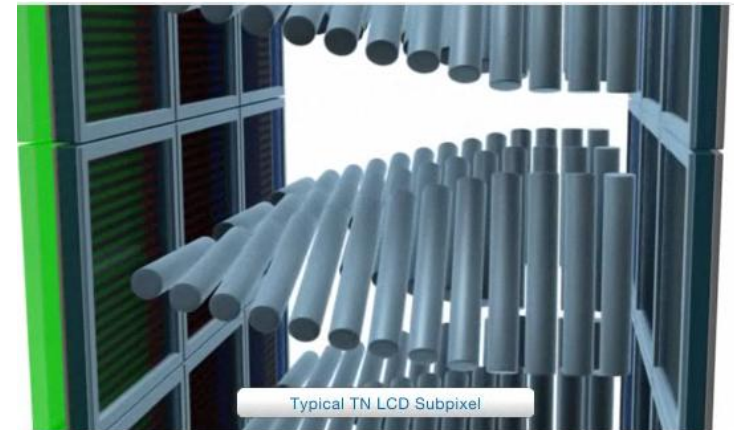
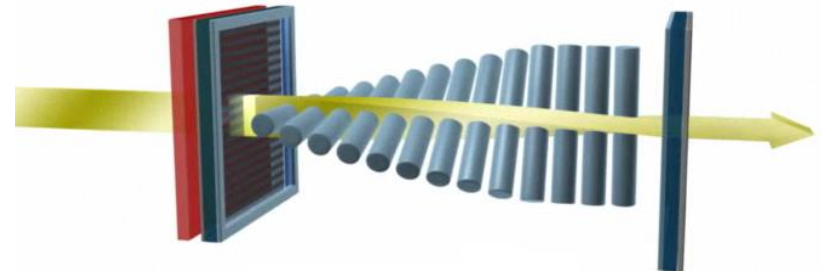


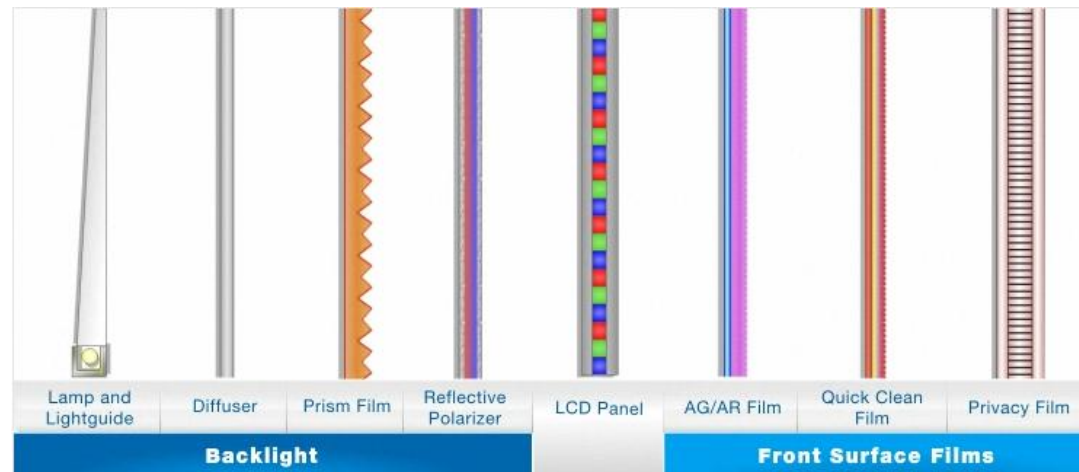
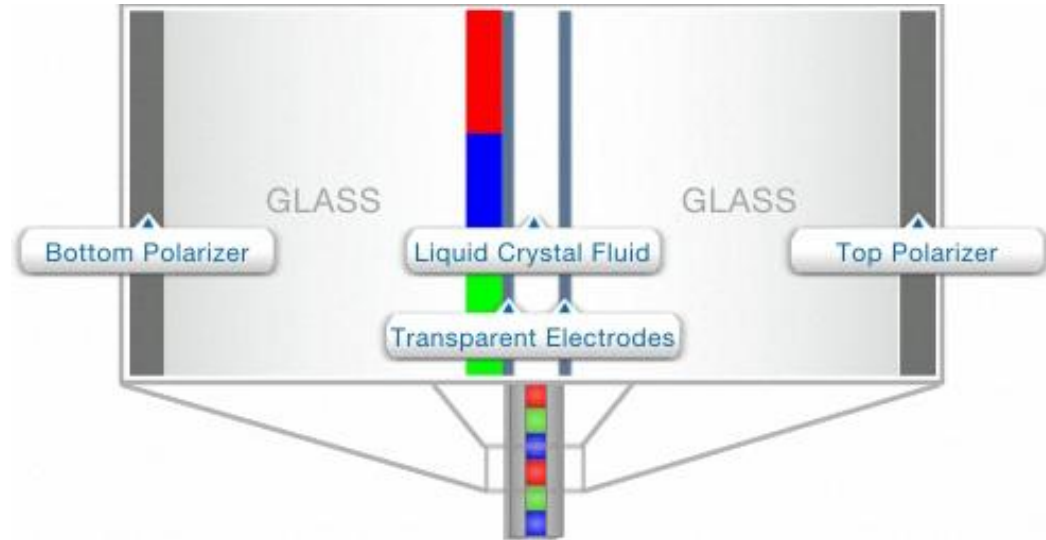
LCD (Liquid Crystal Display)

- LCD Panel is based on
 - A light valve for each pixel that turn the light on, off, or an intermediate level.
- Grid of such light valve for the LCD display panel.
- A back light and display enhancement films create the illumination.



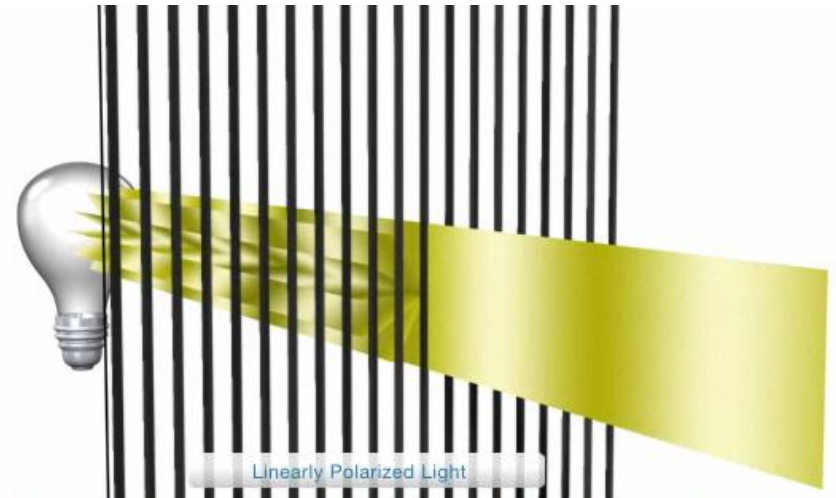
LCD-Display

- Applying voltage to the electrodes changes the level of illumination in each sub-pixel
- The panel is sandwiched between
 - Front surface films to enhance display property
 - Backlight



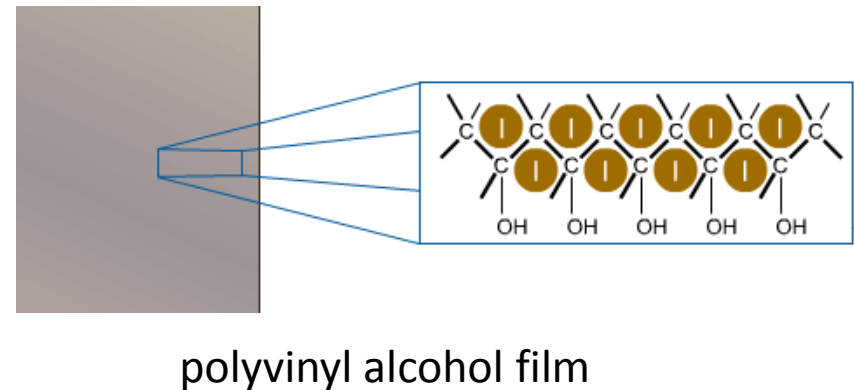
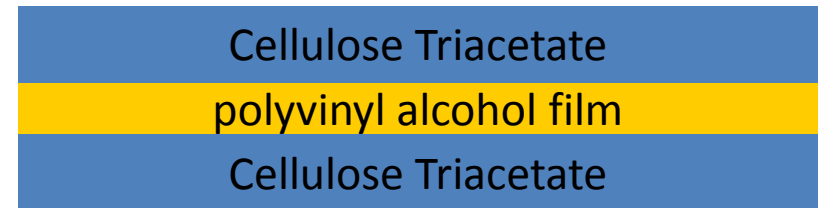
Linear Polarized Light

- Light usually vibrates in all direction
- A linear polarized light limit the vibration to one direction
- It absorbs the component of light that vibrate in all other direction.
- LCD require light to vibrate in one direction



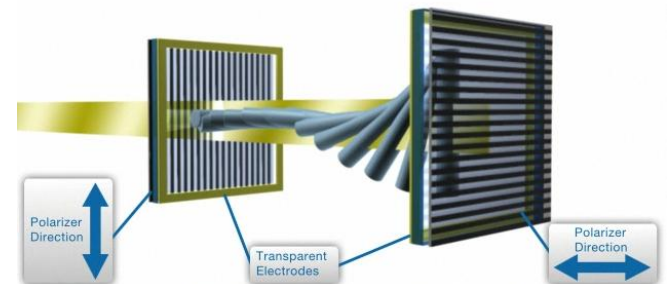
Iodine Based Polarizer

- Is the most common polarizer
- It is made by
 - Stretching a cast polyvinyl alcohol film (PVA) to align the iodine in turn.
 - Staining it with iodine
 - The stained PVA laminated between two slices of cellulose triacetate.
- The cellulose triacetate
 - Provide physical rigidity
 - Some degree of heat and humidity protection



About Liquid Crystal

- Liquid crystal molecules can move freely while maintaining their orientation.
- It aligns itself to a polyimide film to the inside of a panel glass.
- When the two glass panels are not aligned the liquid crystal twists accordingly.
- The liquid crystal will also align to electric field.



Light Path

- The light passes through the polarizer.
- The voltage applied to the electrodes controls the liquid crystal orientation
- The liquid crystal orientation controls the rotation of the incoming polarized light.
- Color filters are used in color LCD, where each color sub-pixel is controlled individually

