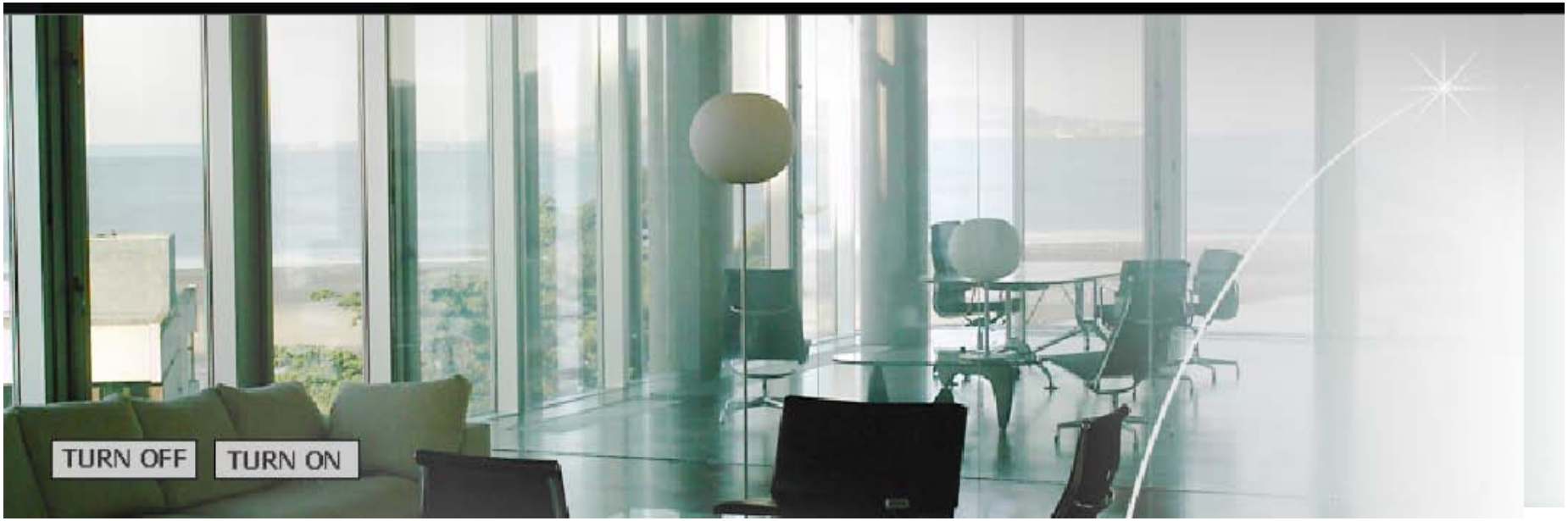
Polymer Dispersed Liquid Crystals (Smart Glass)

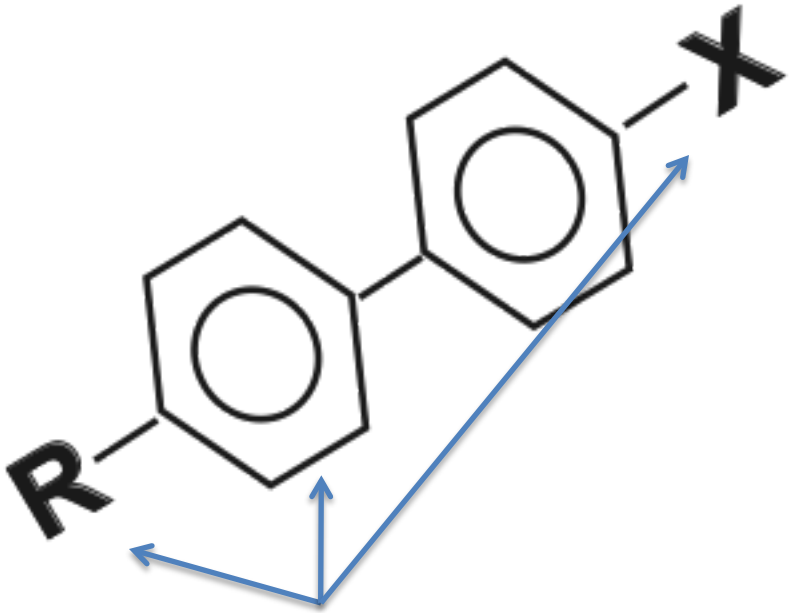


$370 for this small sample!

http://www.smartglassinternational.com/

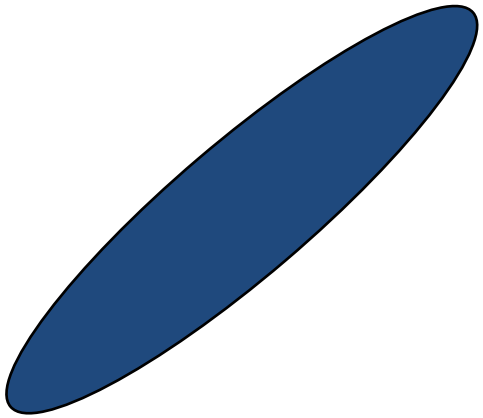
The Liquid Crystal Molecule

The Chemist's View:



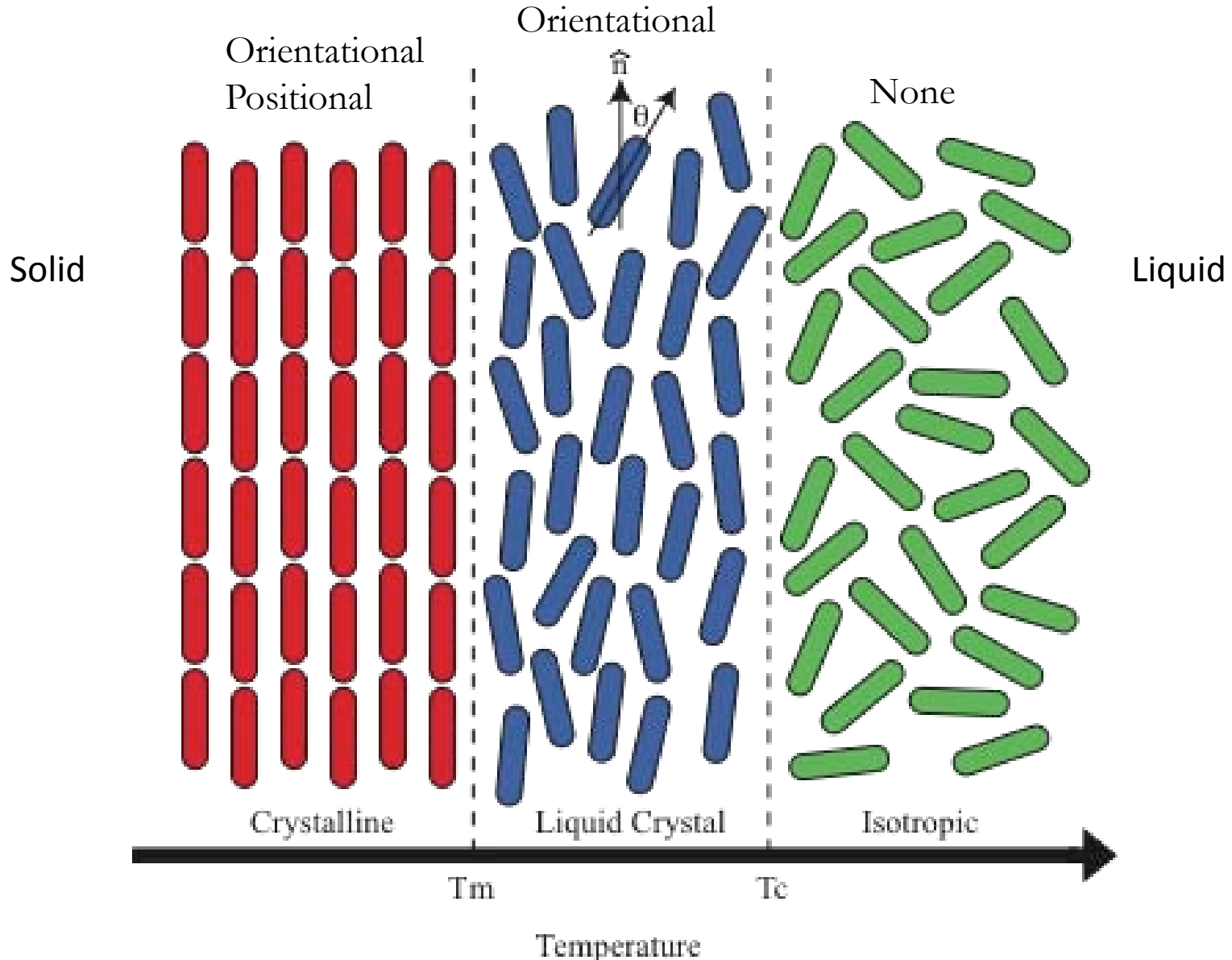
These values determine specific properties

The Engineer's View:

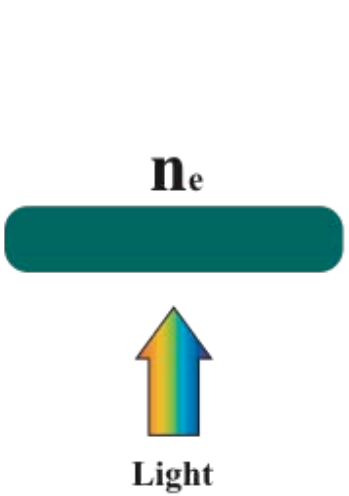


Shape anisotropy
Length>Width
Typ: ~2nm x 0.5nm

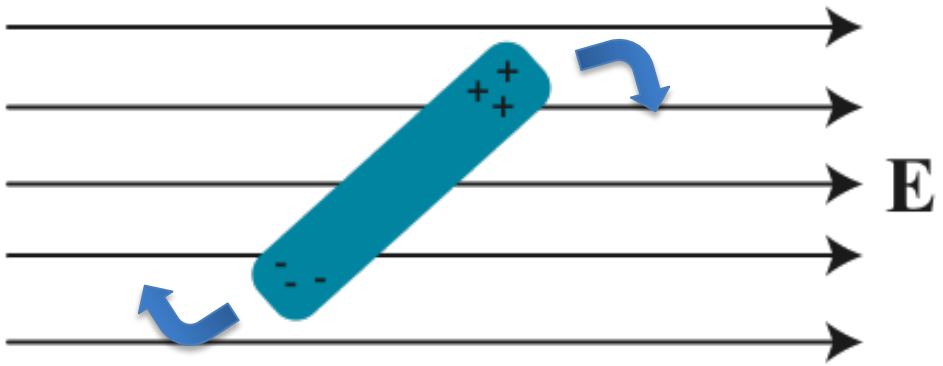
Molecular Order



Anisotropic Properties



- Liquid crystal molecules have different refractive indices depending on the orientation of incident light

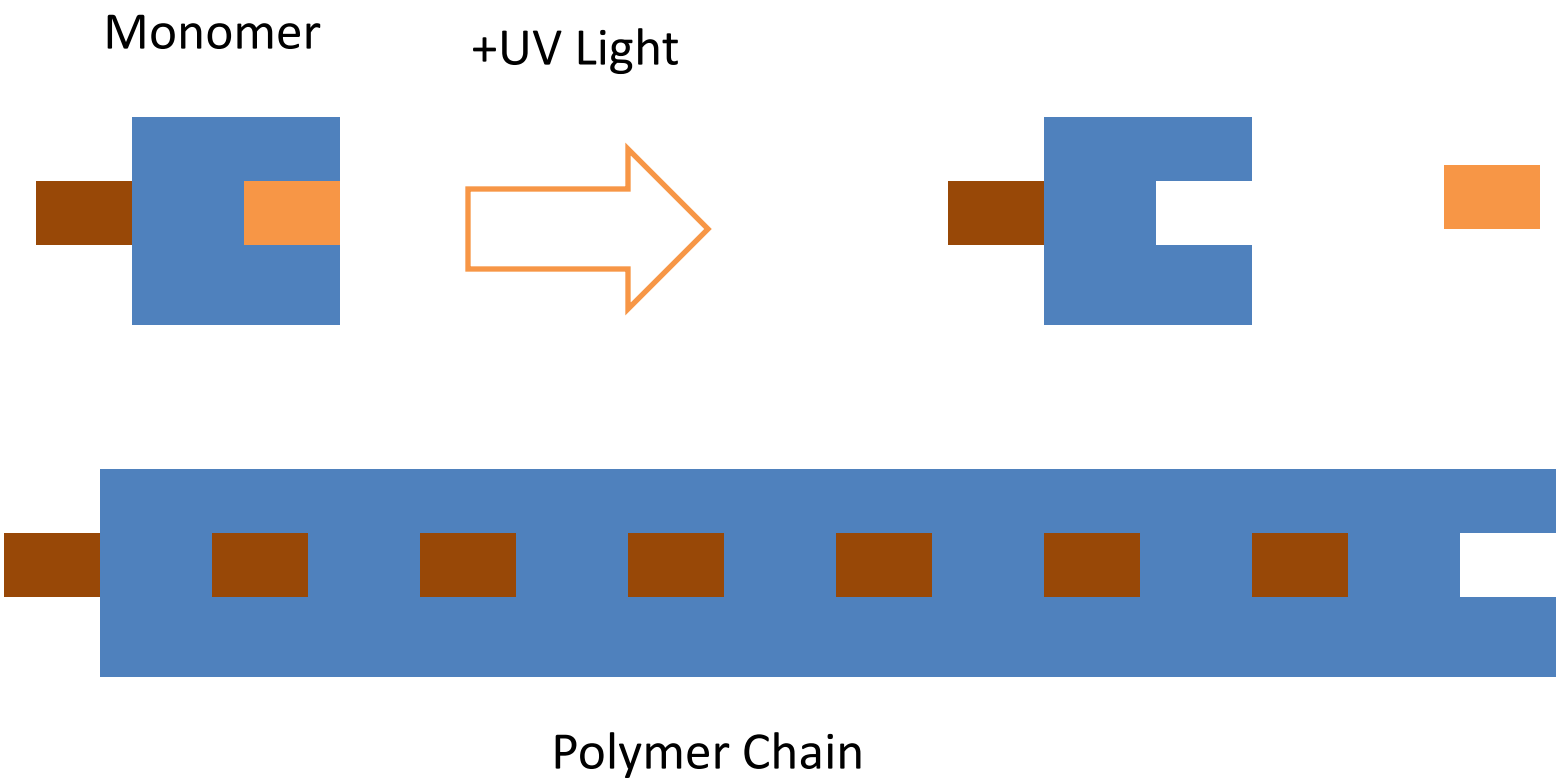


Refractive Index

- Measure of how easily light travels through a material
- Common Refractive Indices
  - Vacuum n=1
  - Air n=1.0002
  - Water n=1.33
  - Liquid Crystal E7 n_o=1.52
    n_e=1.74
  - -NOA 65 Polymer n=1.54

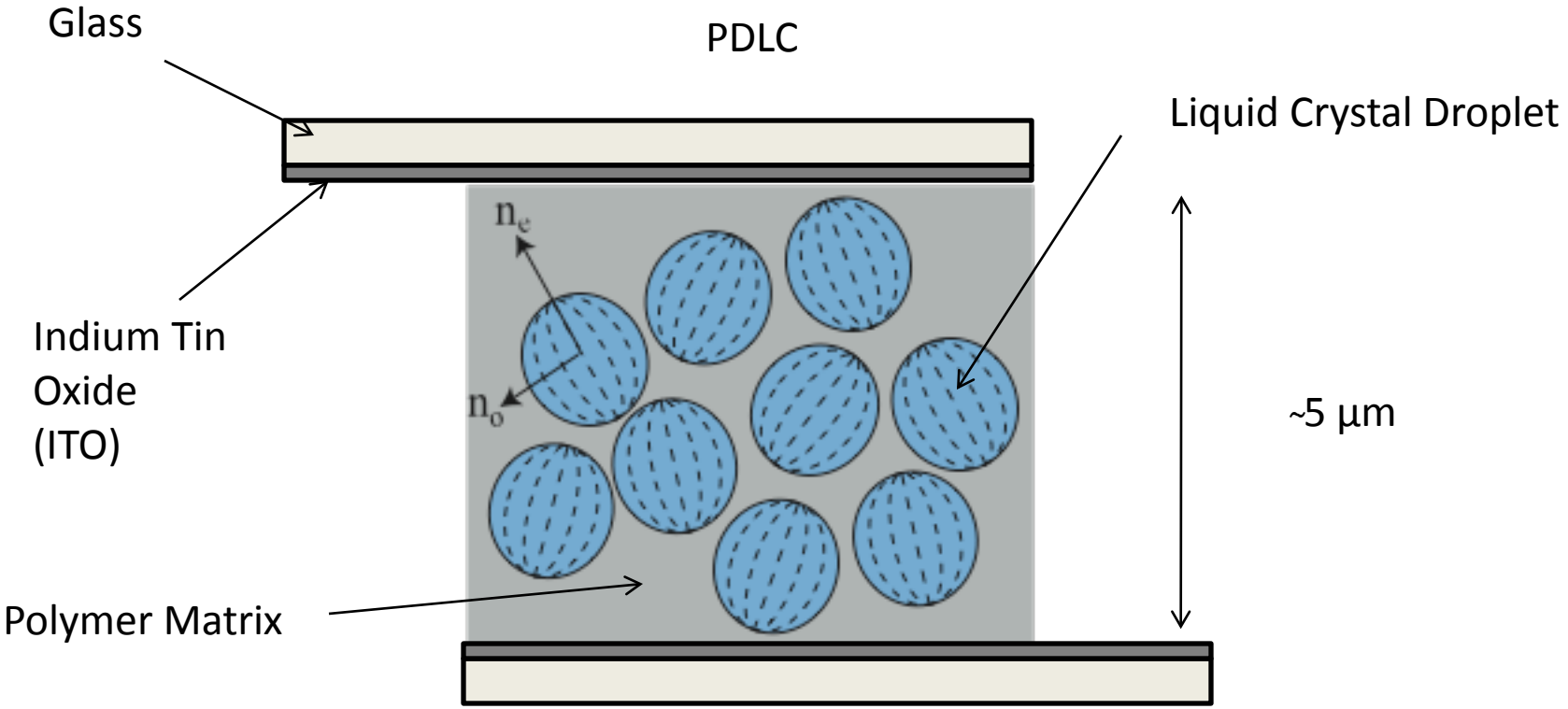
Polymers

- We will use UV activated NOA 65

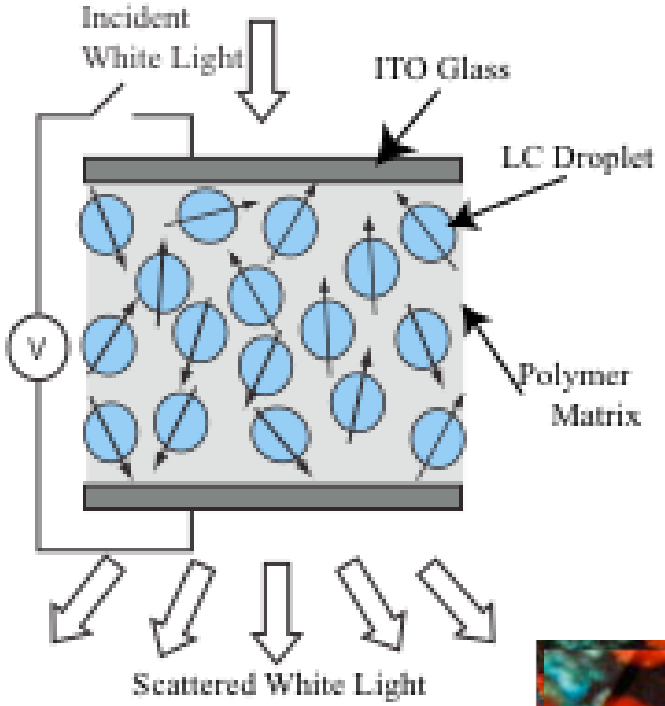


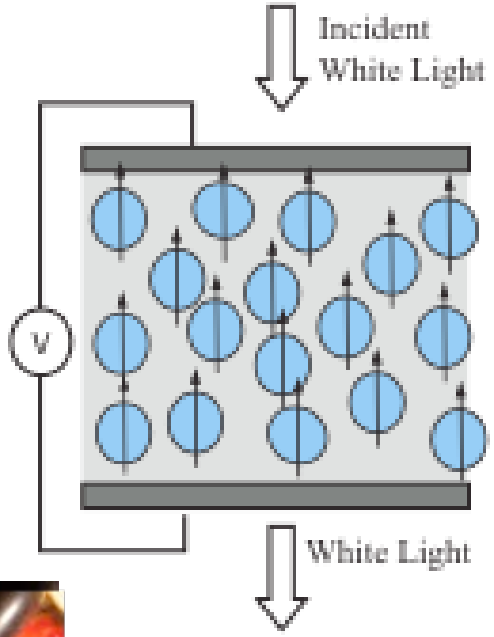
Liquid Crystal Dispersions

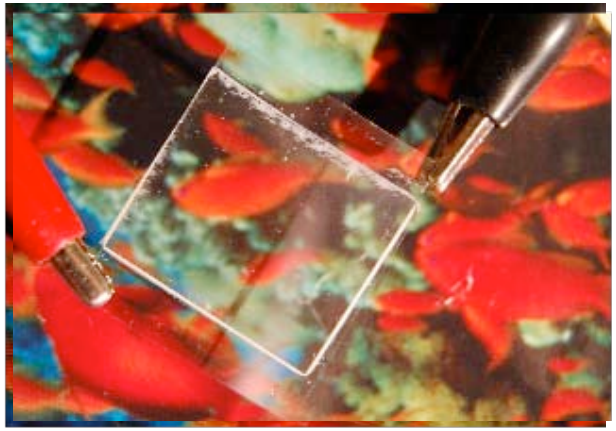
- Polymer dispersed liquid crystal (PDLC)
- Liquid crystal cured in polymer
- Spherical droplets of liquid crystal molecules



Polymer Dispersed Liquid Crystal







Procedure

- Take 2 pieces of glass and find which side is coated with ITO using the multimeter.
- Get a drop of liquid crystal/polymer mixture on one piece of glass, sandwich the drop between both pieces, and use the clips to squeeze the glass pieces together for ~5 minutes.
- Remove the clips and expose the sample under the black light for ~10 minutes.
- Examine the switching properties of the sample (smooth transition, sharp transition?)