**PROJECT OVERVIEW**

Objective: Construct two models for LCD manufacture

Most dominant flat panel display in market: liquid crystal display (LCD) However, LCD is still in need of further improvement.

Technologies of manufacturing LCD

1) Rubbing
2) Photoalignment

Photoalignment is better due to its more applications on fiber communication and other fields

Two mechanisms of photoalignment

1) Pure reorientation
2) cis-Trans Isomerization

Implementation of models for the two mechanisms respectively:

1) Diffusion model
2) Two-state model

In our project, both models will be implemented in MATLAB which is a high-level technical computing language.

**METHODOLOGY**

**Cis-Trans Isomerization:**

A reversible trans-cis transformation of azo-dye molecules can be observed under the action of polarized light.

**Pure reorientation:**

An mechanism related to the reorientation of the dye molecules due to the action of the polarized light illumination

Order parameter of dye molecules

**Diffusion model:**

Diffusion model is a model describing pure reorientation of the azo-dye molecules

The simplified two-dimensional model:

The model can be characterized by the following parameters:

- The photoexcitation parameter, \( v_1 \)
- The interaction parameter, \( v_2 \)
- The diffusion constant \( D_x \)

**Two-state model:**

Two-state model is a model describing the trans-cis transformation of azo-dye molecules under the action of polarized light.

The kinetic rate equations:

- The activation rate, \( v_b \)
- Lifetimes of the excited state, \( a \)
- Two thermal relaxation rates, \( b_1 \) and \( b_2 \)

**RESULT**

Two-state model

The graphs show that the two models well fit the experimental data.

Diffusion model

It demonstrated that the phenomenological approach can be a useful tool for studying photoinduced ordering processes in azo-dye films.