Preparation of a Mechanochromic Elastomer using Liquid Crystal Dispersed in Polymer
Background | Applications for optically dynamic materials

Conservation

Display

Sensing

Productivity

gravinawindows.com

thebwd.com

us.hartmann.info

thinkgeek.com
**Background | Polymer dispersed liquid crystal (PDLCs)**

**Mechanism behind PDLC**

PDLC materials consist of micron sized nematic liquid crystal droplets dispersed in a polymer matrix. [1]

Reorienting the droplets changes how light is transmitted.

Optical behavior is affected by anchoring energy, size and shape of droplets, and refractive index contrast. [1]

**Existing PDLC Technology**

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**Goal** | Design a high-performing mechanochromic PDLC

- **Cost Effective**
- **Mechanically Sensitive**
- **Optically tunable**

**STRATEGY**

**MATERIALS**
- 5CB liquid crystal
  - CH3
  - C
  - C

- Polydimethylsiloxane (PDMS)
  - Si - O - Si

**EMULSION**
- Combine PDMS precursor and curing agent in a 30:1 weight ratio
- Add 5 weight percent liquid crystal
- Stir for 1 minute and degas.

**CURE**
- Cast on glass substrate.
- Cure at 120°C for 20 minutes.
- Peel off!
Results | Film exhibits a 50% change in transmittance
Results | Demonstrates potential for high precision tuning

- Low strain levels compress polymer void
- High strain levels change liquid crystal fluctuations

Graph showing % Transmission vs. Strain Level with optical and SEM imaging.
Visit my poster to learn:

1. How the optical, mechanical, and morphological properties of this material were characterized.

2. Our plans to use this material for smart windows and biomedical sensors.

Thank you for your time and attention!
References


