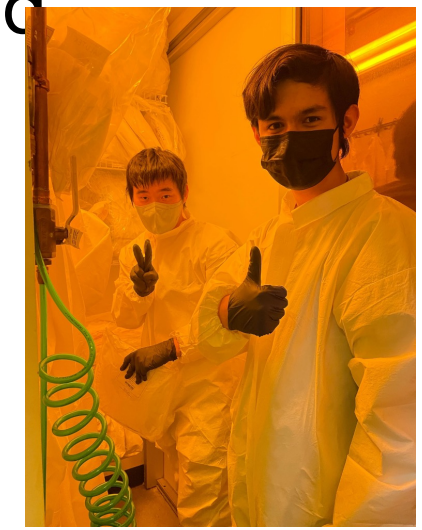
ARISE Week 2

Joel Grayson

What We Did

- Found that BrDPA-BipyET is resilient for at least eight cycles of melting and cooling and BrDPA-AzoBipy at least seven cycles. We will use the films for many cycles to conserve our small amounts.
- Tested BrDPA-AzoBipy for best cooling temperature and pressure.



Visiting plasma lab

BrDPA-AzoBipy Cooling Temperature

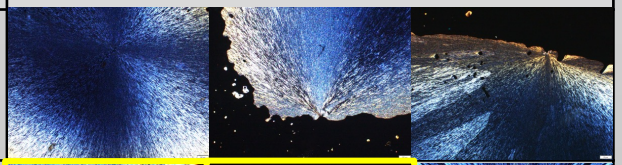
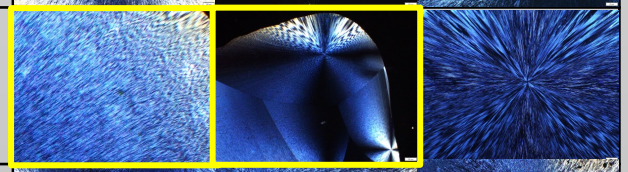
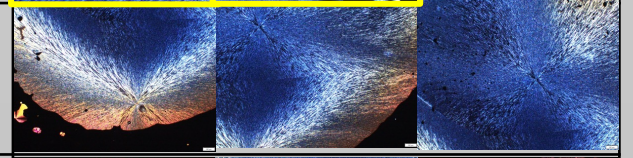
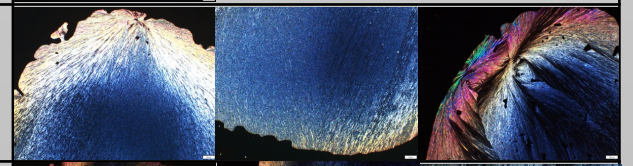
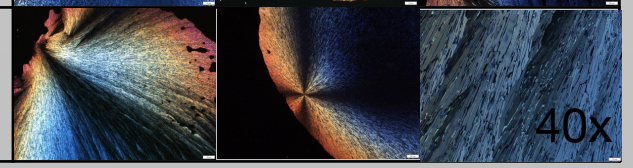
Methodology

Melted powder at 140°. Then, waited for them to crystalize at different cooling temperatures without pressure. Tested each temperature twice or thrice.

Conclusion

- Best cooling temperature for getting the entire thing as one spherulite: 100° or room temperature
- Best cooling temperature for crystallization: 50°. However, twisting is inconsistent.
- Observations
    - Takes a longer time to crystalize at higher cooling temperatures.
    - Nucleation often happens at the edges. Theory for why: as the crystal melts and expands, it pushes out dust and other impurities to the edge of the puddle. Crystallization can occur easier at these impurities at the edge.

Results

Cooling Temperature	Observations	Photos (4x objective)
Room temperature	1/3 Entire thing single spherulite 0/3 Twisting	
50° (control)	2/7 Twisting	
75°	0/2 Twisting	
85°	0/2 Twisting	
100°	1/2 Entire thing single spherulite 0/2 Twisting	

BrDPA-AzoBipy Pressure

Methodology

Melted powder at 140°. Then, cooled it at 50°, placing a block of a certain weight on top.

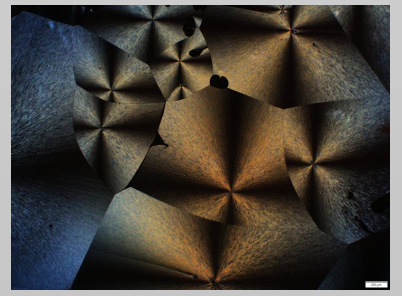
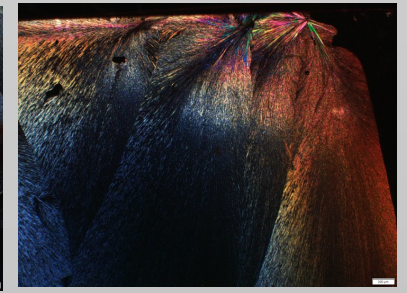
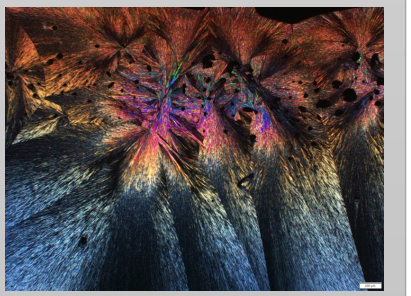
Conclusion

Many small spherulites for the higher pressure. Theory for why: higher pressures encourage more nucleation points because the liquid is more immobilized by pressure.

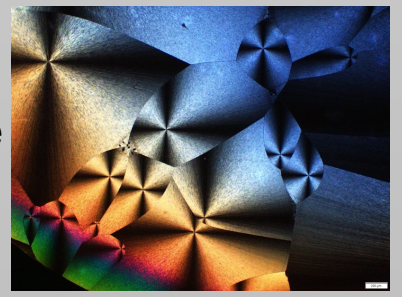
Results

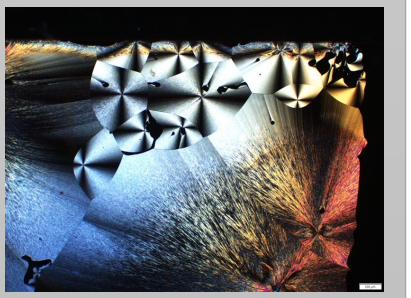
No crystallization

45g pressure

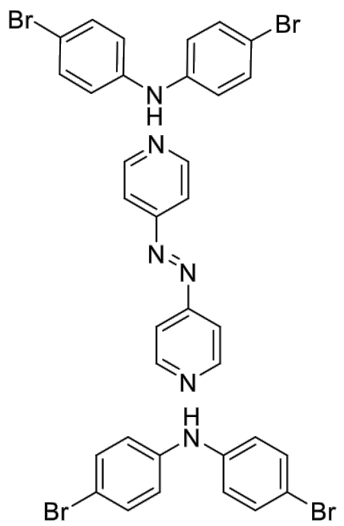
262g pressure





BrDPA-AzoBipy's Photochromic Properties

A film of the compound did not show photochromic behavior under the Craig's UV-Vis light at room temperature. This does not mean that the compound is not photochromic. Terrence theorizes that it requires more energy to isomerize because of its long appendages off the azo group. In order for the molecule to twist, it needs to move other molecules out of the way, requiring a lot of energy in the solid form.



Thanks Terrence!

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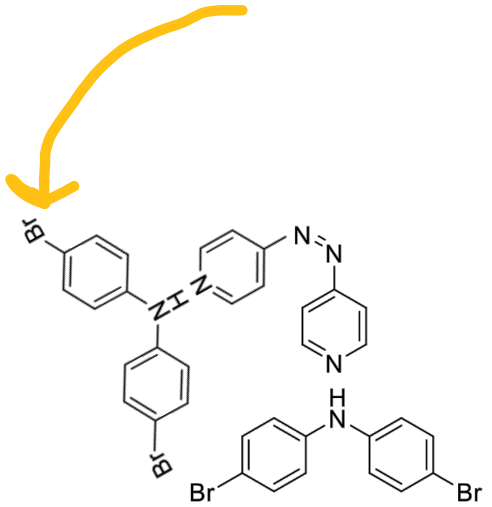

Thanks Terrence!

Overall Conclusion

BrDPA-AzoBipy is good at creating one giant spherulite for an entire film. However, it does not twist on its own. Let us try to use additives to make twisting occur more consistently.