ARISE Week 3

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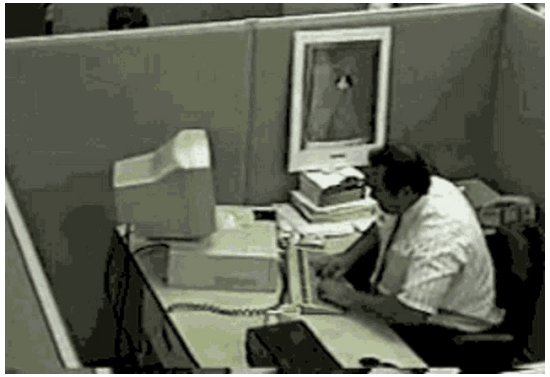
What We Did

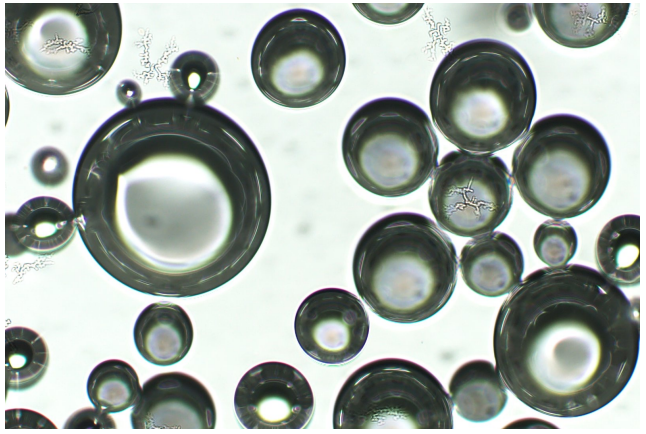
- Wrote abstract
- Tested damar gum
- Tested BrDPA-AzoBipy mixed with damar gum at 4.7, 8.9, and 15 weight percentages for pressure and cooling temperature
- Shadowed Pallavi on the SEM and sputter coater
- Create this presentation twice after forgetting to save ☹

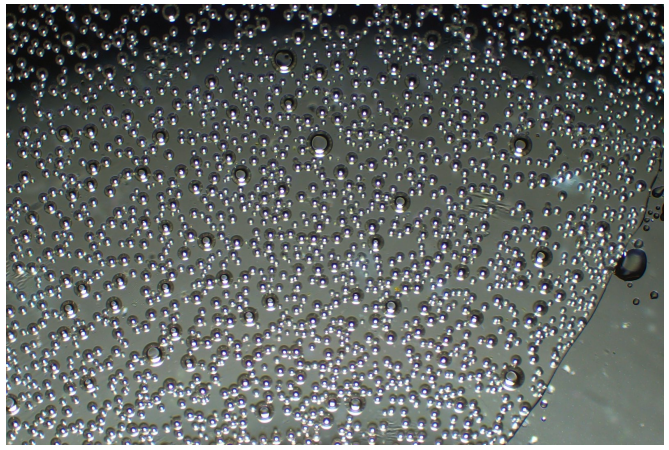


Pure Damar Gum

Formed balls, not crystals. Perhaps we did not give it enough time to crystallize.

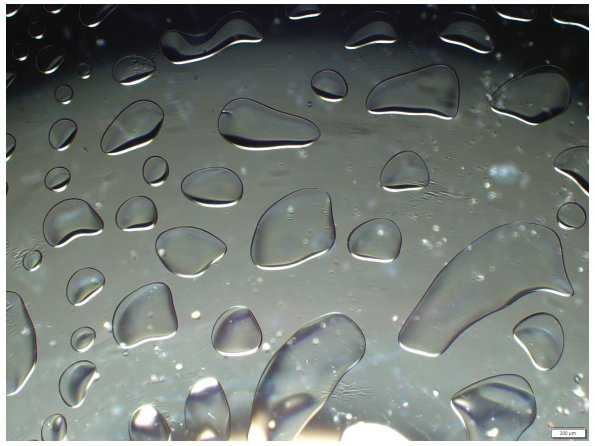
TM 120 TC 50

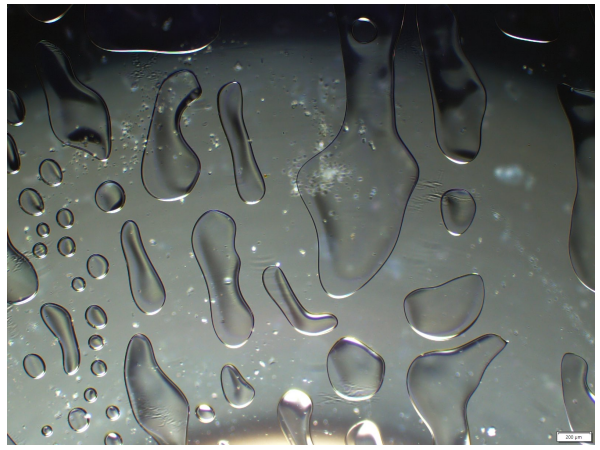




40x

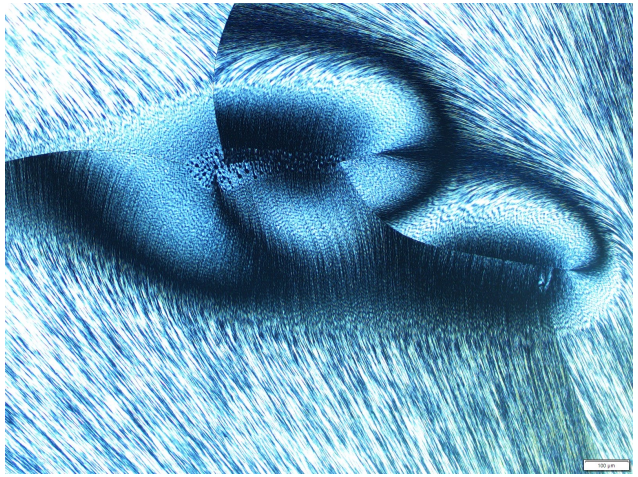
TM 140 TC 60



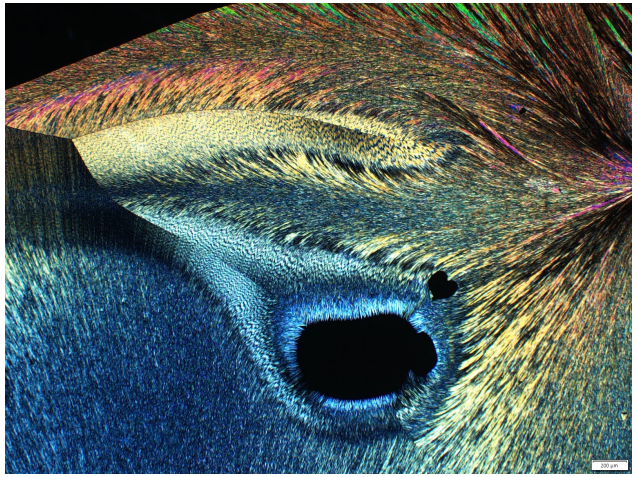


BrDPA-AzoBipy 4.7 wt% Damar Gum Cooling Temperature

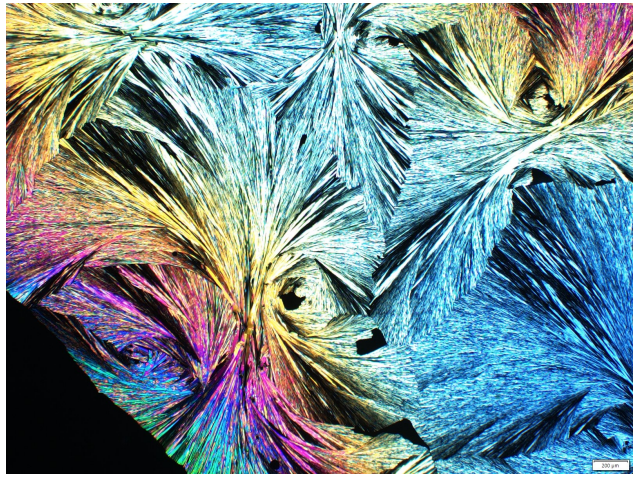
Not much twisting for 50°, 70°, and 100°. Conclusion: 4.7 wt% is too low.



50°



70°



100°

BrDPA-AzoBipy 8.9 wt% Damar Gum Cooling Temperature

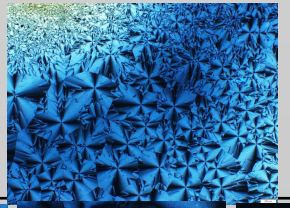
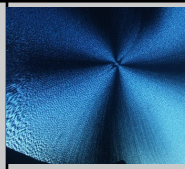
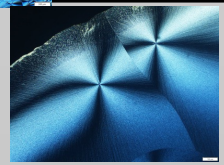
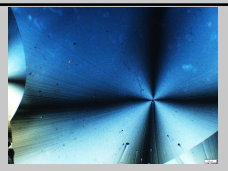
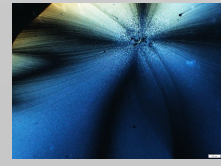
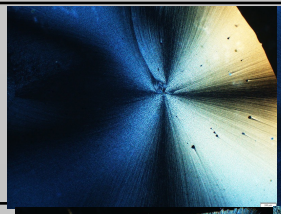
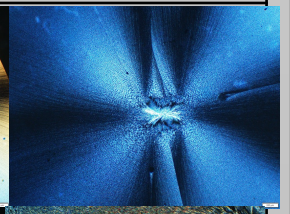
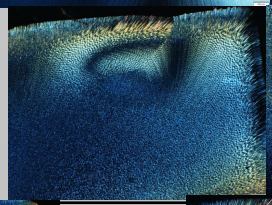
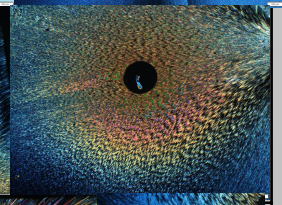
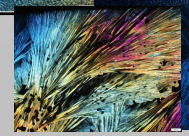
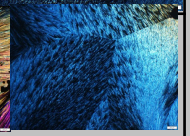
Methodology

Heated at 140° at the melt. Waited for it to cool at varying cooling temperatures. All done on one reused film.

Conclusion

- The cooling time increased as the temperature increased in this range of 25–100°.
- The best cooling temperature is 70°.

Results

Cooling Temperature	Observations	Photos
Room Temperature	Crazy small ones. Chaos. Very few spherulites, some of which are twisting.	 Chaotic
50°	~3 seconds to crystallize. Twisted crystal spherulites were weird-shaped.	 Twisted Normal  Twisted Weird  Straight
60°	~6 seconds to cool. Many straight regions. A few twisted.	 Straight  Twisted
⭐70°	~5 seconds to crystallize. Almost entirely twisted. Many spherulites.	Twisted  
90°	~6 seconds to crystallize. Chaotic; straight and twisted spherulites	Twisted  
105°	~7 seconds to crystallize. Not much twisting.	 Twisted   Not Twisted

BrDPA-AzoBipy 15 wt% Damar Gum Cooling Temperature

See here (docs.google.com/document/d/12FkHr-R68AV_ZypWBx08luq56GatFdX4aMld_EmHlyo/edit)

BrDPA-AzoBipy 8.9 wt% Damar Gum Pressure (Experimented Twice)

See here (docs.google.com/document/d/1wIjZztccMq8ataX44R1vnITGM4GHIbw2-Ocl-dRCfRA/edit)

Conclusion

- Pressure did not help
- Pitch is smaller as pressure is higher

Additive Conclusion

0 wt% - forms large spherulites, but twisting rare

4.7 wt% - formed more

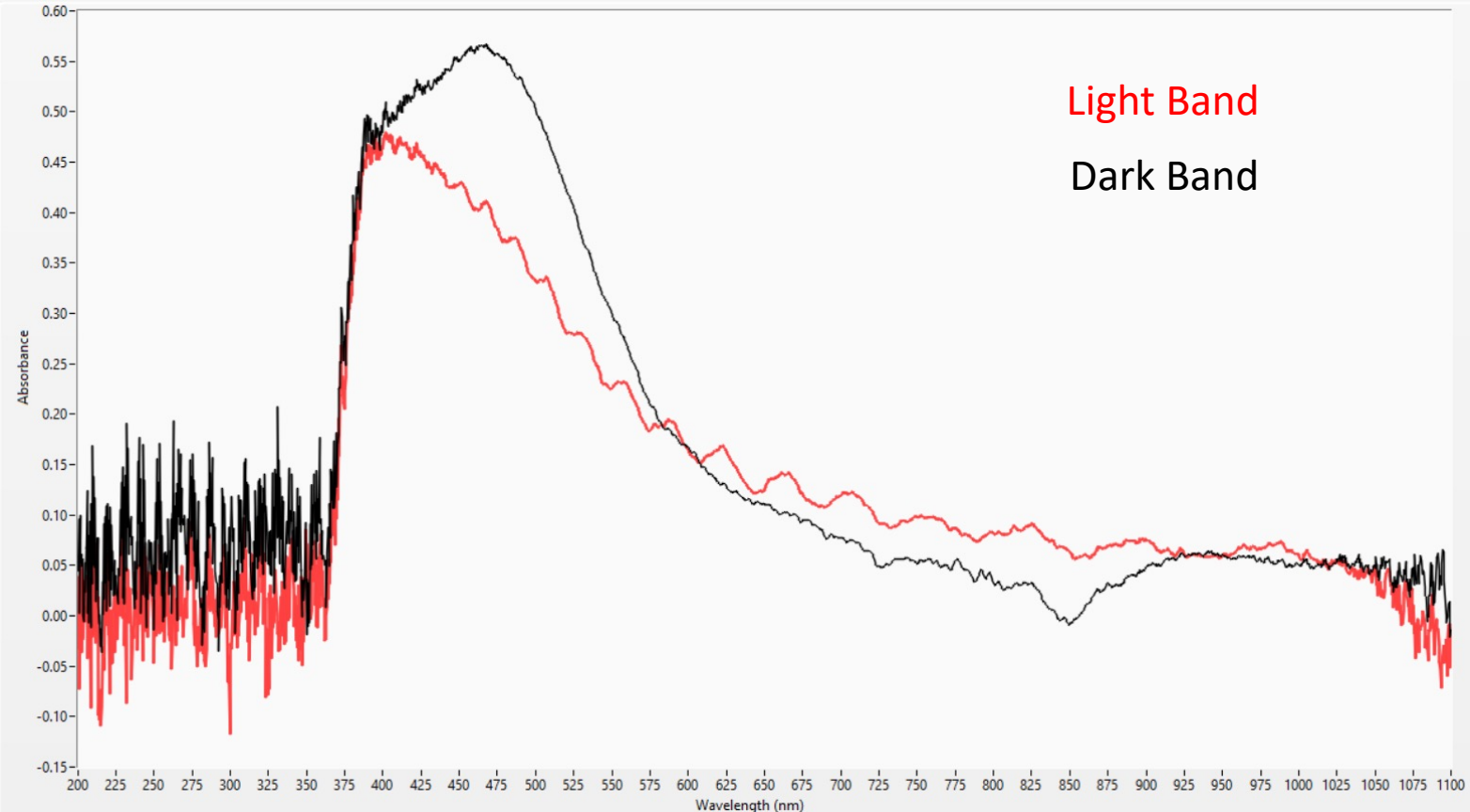
8.9 wt% - many spherulites of different shapes, twisting

~15 wt% - too many spherulites. Twisting.

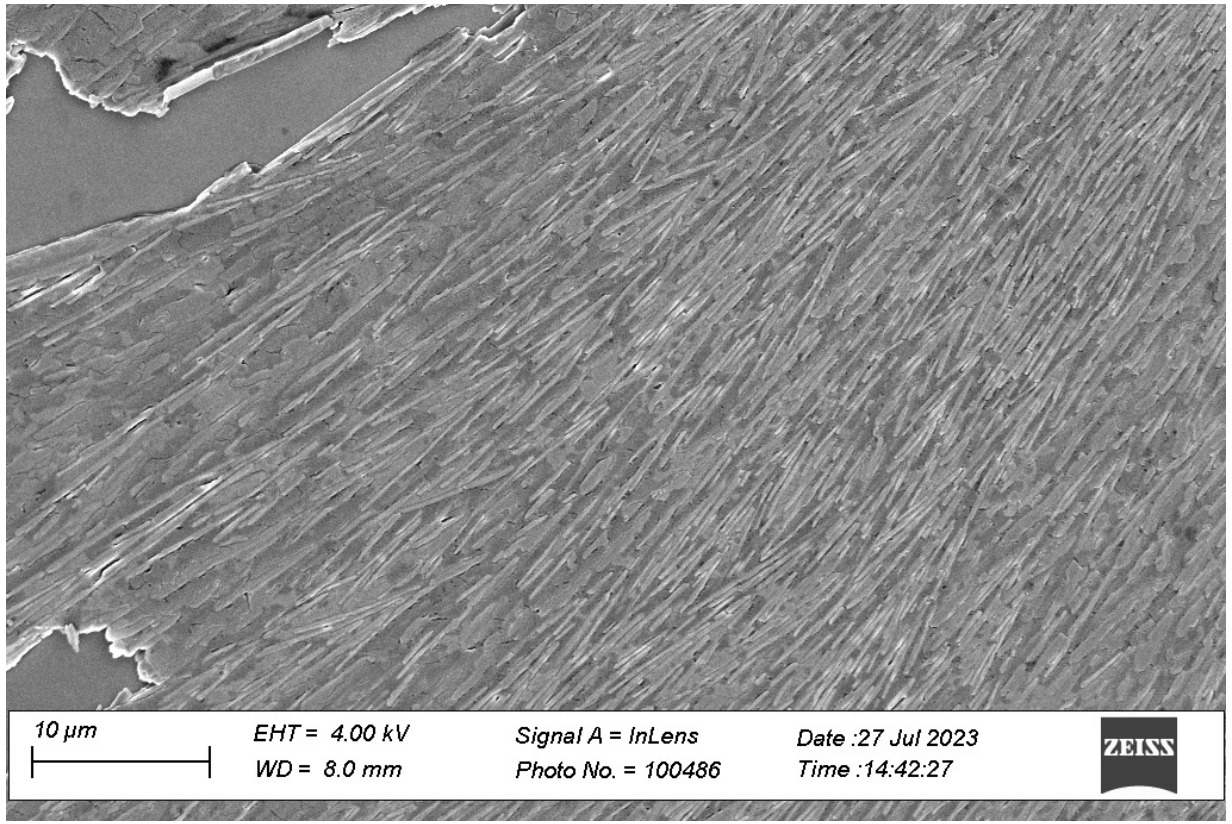
Damar gum helps BrDPA-AzoBipy twist, but it increases inconsistency and the density of spherulites.

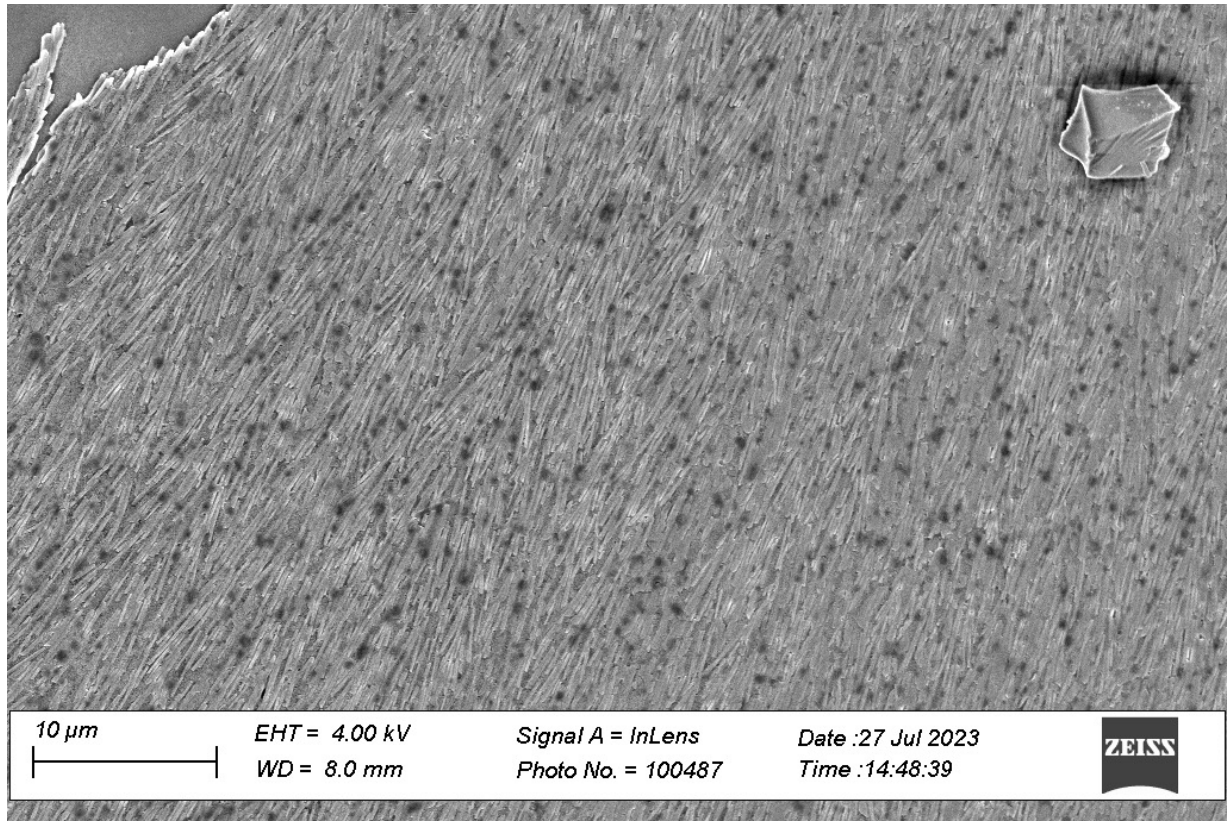
Craic

Analyzed the absorbance (linearly polarized at 90°) of the dark and light bands of BrDPA-AzoBipy with 10 wt% Damar Gum (TM 140 TC 70)



SEM





Able to see the grains

Next Steps

Goal: make it of one morphology or a large spherulite and increase consistency.

Let’s try polyethylene.