Liquid Crystalline Elastomers

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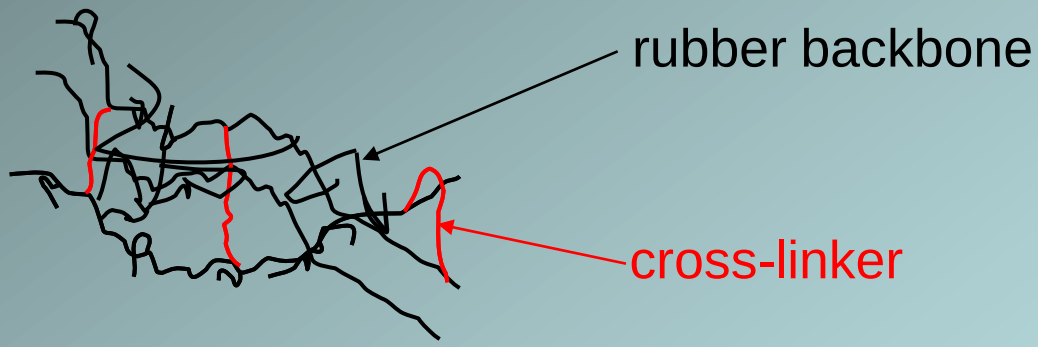
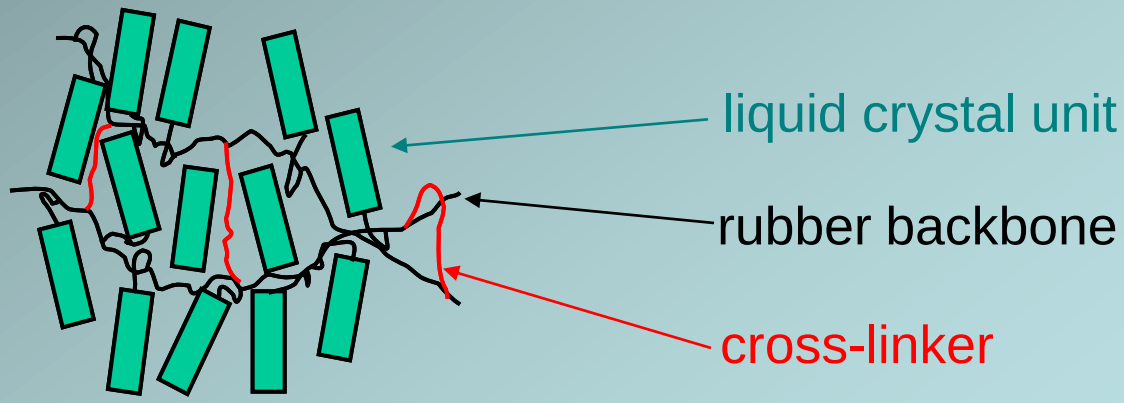
Liquid Crystal Elastomers

- Conventional rubber

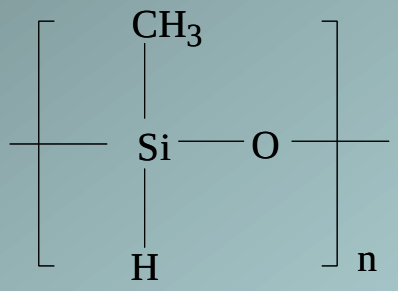


- LCE: liquid crystal rubber

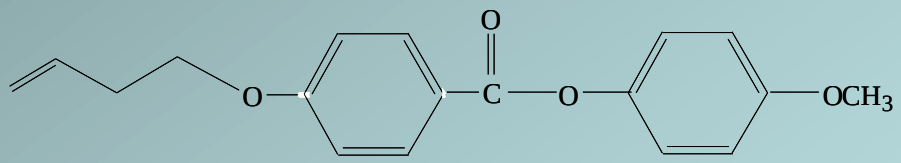


LCE Composition

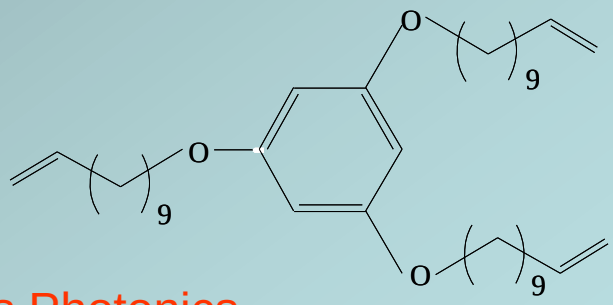
- Rubber backbone (main chain)



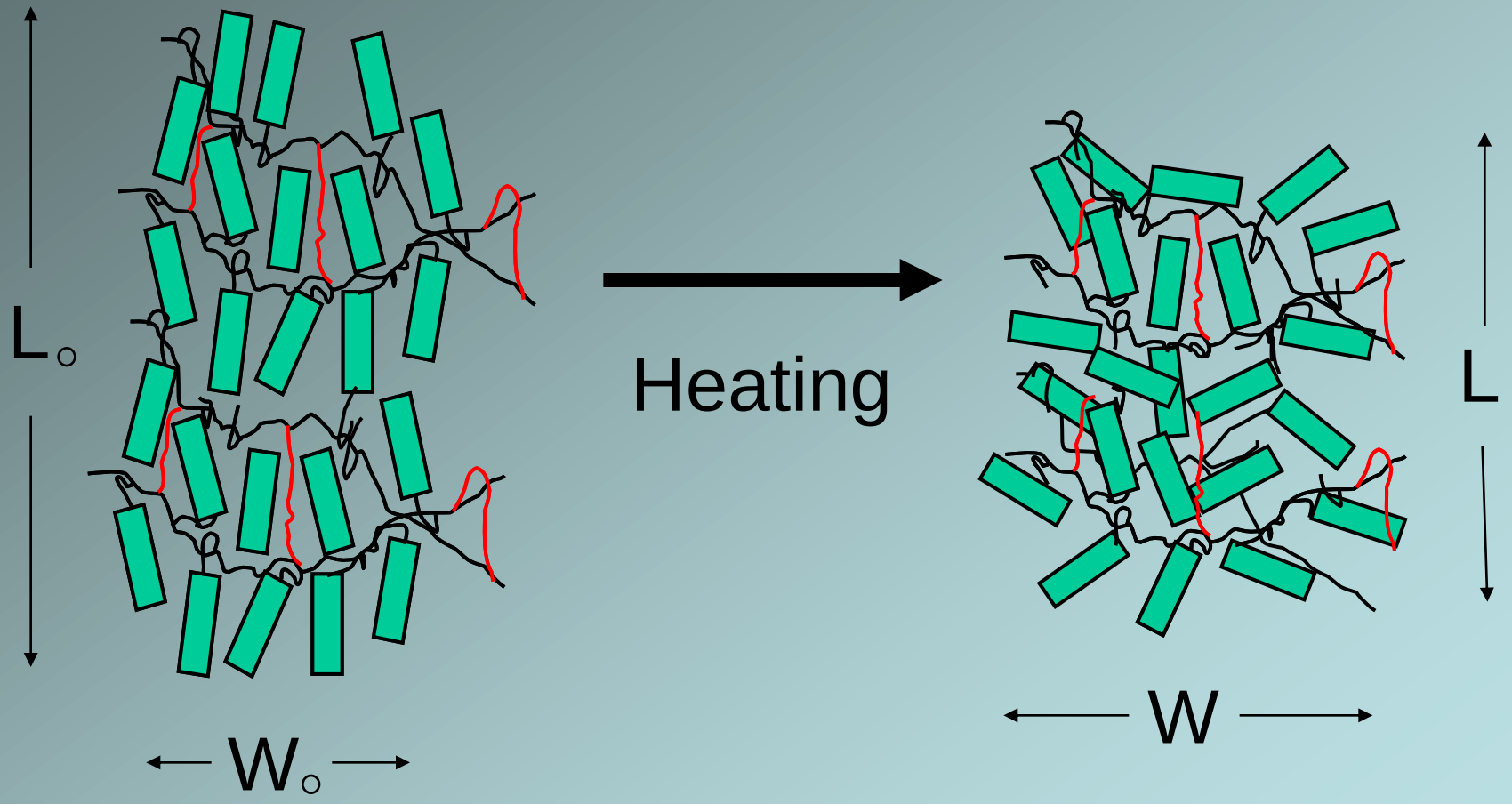
- Liquid crystalline unit (side group)



- Crosslinker

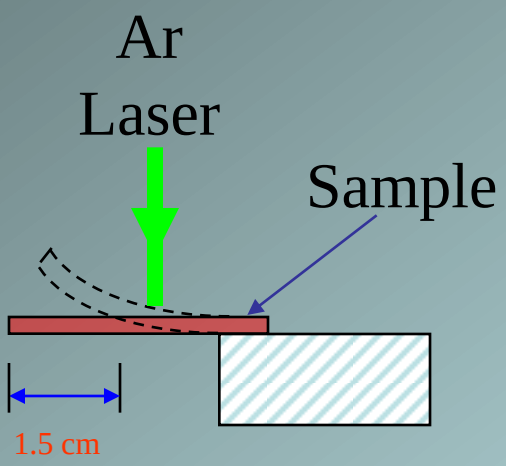


Elastomer Shape Changes

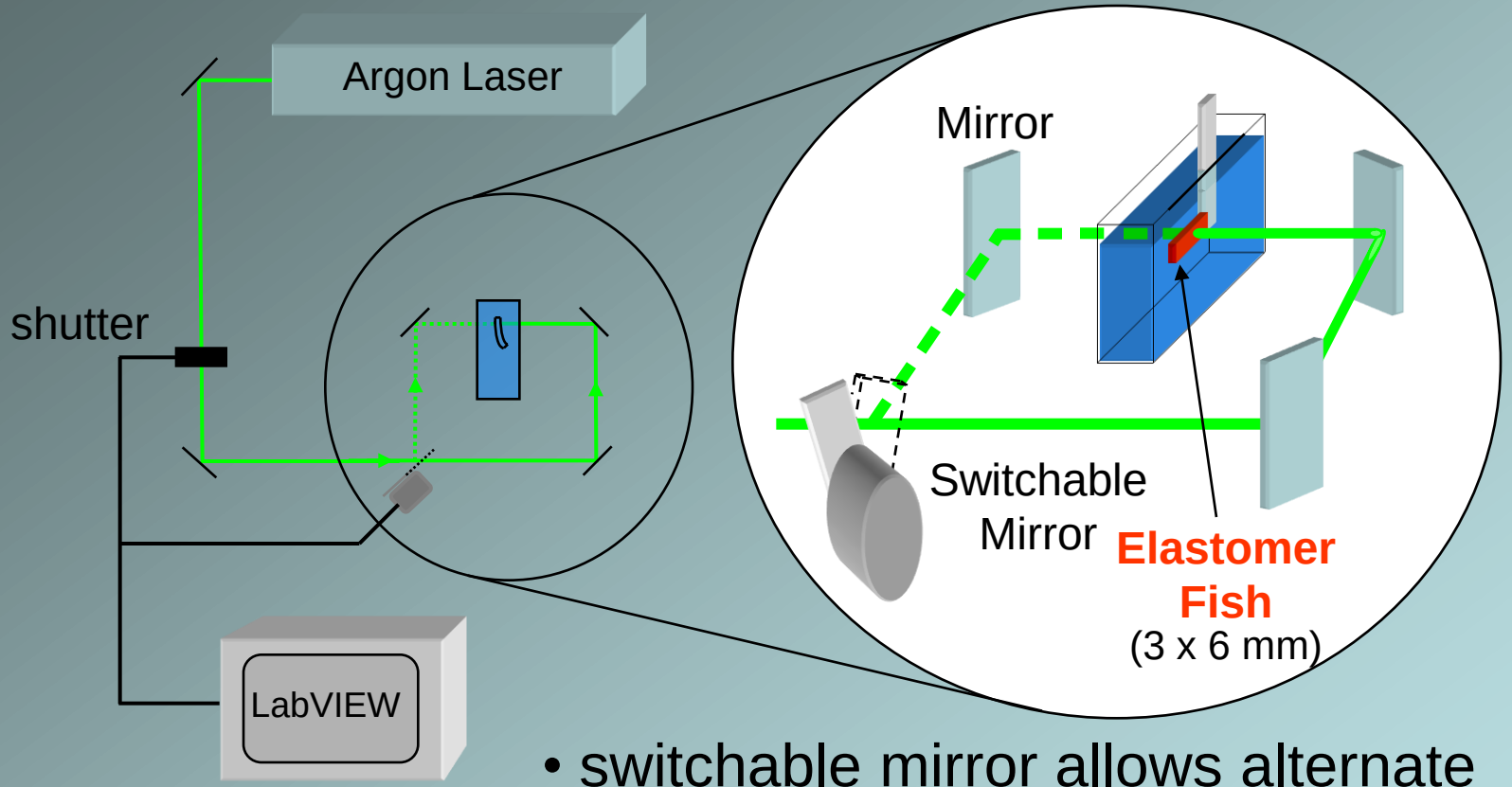


Light Induced Bending of LCEs

• laser illumination causes the elastomer to bend towards the beam, as shown



Elastomer Fish

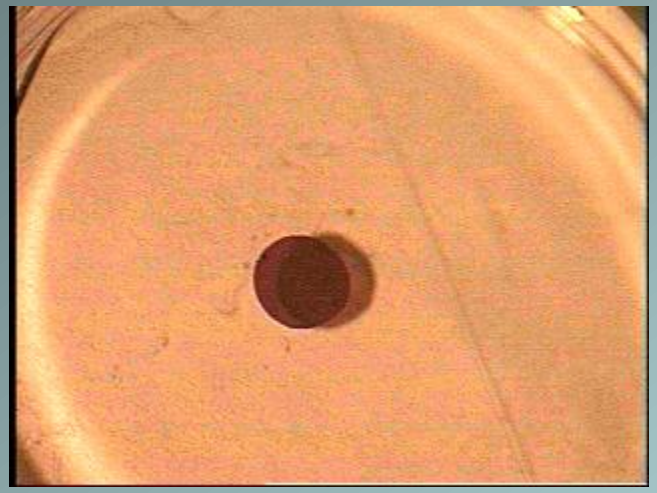


- switchable mirror allows alternate illumination of each side of LCE sample

Elastomer Fish

- sample immersed in rheoscopic fluid, which allows for flow visualization
- sample is illuminated alternately on both sides by light at 514nm from Ar laser

Another Elastomer Fish



Shape changes propagate like a wave down the sample causing it to swim away from the light.

Conclusions

- LCEs add a LC component to a conventional rubber
- LCEs have unique properties
- Many potential applications for LCEs
- Need more research for commercialization