Miniaturized Self-regulating Liquid Crystal Oscillators

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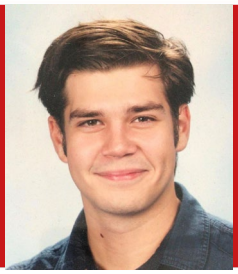
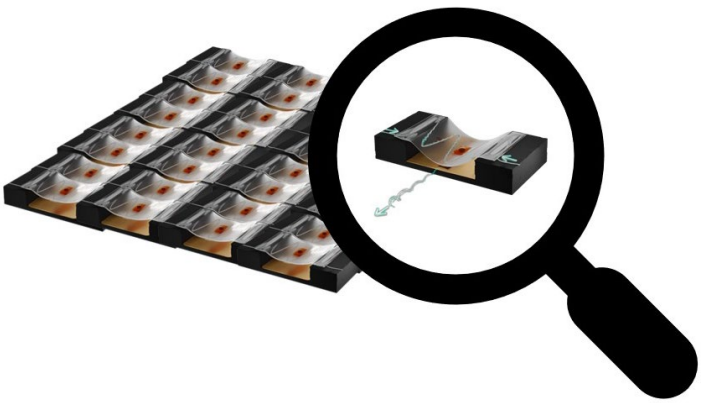


Introduction

Self-regulation is crucial within automated systems ranging from industrial manufacturing arms to vacuum-cleaner robots. Self-regulation can be potentially brought into the world of mm-scale soft robotics through the application of responsive liquid crystal materials, overcoming size and compliance limitations of conventional controllers, actuators and sensors. This development would be of great interest in microfluidic, surface transport and haptic applications.

Project summary

The self-regulating functions of electrically-functionalized liquid crystal oligomer network (LCON)–based soft robots has been shown in prior work at the cm-scale, which is an unsuitable size for microfluidic, surface transport and haptic applications. Therefore, this project will miniaturize the existing self-regulating LCON oscillators into the mm-scale. Liquid crystal network (LCN) chemistry may be useful for this scale change. Yet, the electrical functionalization of the material must be retained together with its self-regulating properties. The use of sputter coating, laser-cutting and custom PCB-board designs are planned to overcome this challenge.



Project goals

- To design conductive LCON/LCN films that display self-regulating properties in the mm-scale.
- To develop electrical driving methods to trigger LCON/LCN materials in the mm-scale.
- To demonstrate the results of the investigation through a refined demonstrator device.

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