**Surpassing Elasticity: Generating Nematic Liquid Crystal Droplets via Solutal Marangoni Effect**

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**Abstract**

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Liquid crystal (LC) is a fascinating phase of matter with unique anisotropic properties that make it appealing for various futuristic applications. However, the inherent elasticity of LC films due to long-range orientational order has made it challenging to rupture them. In this work, we demonstrate a single-step technique to generate an array of large-scale nematic LC droplets overcoming the film elasticity with the help of the solutal Marangoni effect. The solutal Marangoni effect relies on a solute concentration gradient to alter the surface tension of a liquid. We drop-cast hexane onto a nematic 5CB (4-cyano-4'-pentyl biphenyl) film on a water bath, causing the immiscible 5CB droplet to rapidly spread on the slippery water surface with higher surface tension and fragment into an array of solvent-laden LC droplets. The size of the droplets can be controlled by varying the amount of solvent.

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The technique demonstrated in this work could have applications in various fields, including advanced optics, sensors, and microfluidic devices. The ability to generate large-scale LC droplets with precise control over their size and position could open new possibilities for developing novel LC-based technologies. This work presents a single-step technique for generating an array of large-scale nematic LC droplets via the solutal Marangoni effect. This method offers a simple and efficient approach for producing controlled arrays of droplets, potentially leading to the development of various advanced technologies.

**Keywords:** LIQUID CRYSTAL, ELASTICITY, SOLUTAL MARANGONI