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Migration of suspended particles and topological defects within a nematic liquid crystal in anisotropic microfluidic devices NICHOLAS FLOWER, RAGHAVENDRA DEVENDRA, Chemical and Biomolecular Engineering, Johns Hopkins University, Baltimore MD, JOEL ROVNER, ROBERT LEHENY, Physics and Astronomy, Johns Hopkins University, Baltimore MD, GERMAN DRAZER, Chemical and Biomolecular Engineering, Johns Hopkins University, Baltimore MD — Devendra et al. (2010) have explored the mobility of particles in periodic anisotropic arrays of obstacles. They observed that the particles migrate away from the applied force at angles that depend on the size of the particle, suggesting a method for microfluidic separation. Rovner et al. (2010) have shown that a lift force redirects particles in a nematic liquid crystal at an angle to the applied force that depends on the anchoring of the nematic director at the surface of the particle. Combining these approaches for separation of particles, we have investigated the behavior of the nematic 4-cyano-4'-pentylbiphenyl (5CB), both with and without suspended particles, flowing inside microfluidic devices containing arrays of obstacles. We report a certain degree of control over generation of topological defects in the nematic order, which we image using polarized microscopy, and control of the flow direction of these defects and suspended particles. The results suggest new ways to conduct microfluidic separation, as well as a new, controlled method for investigating the behavior of liquid crystal defects in flow.

Nicholas Flower
Chemical and Biomolecular Engineering,
Johns Hopkins University, Baltimore MD

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