

A fiber in a nematic haystack: the nematic director fields around the embedded cylinder

Hyewon Kang

Department of Physics, UNIST, Republic of Korea

Lyotropic chromonic liquid crystals (LCLCs) have exceptionally high anisotropy in their elastic moduli: very small twist modulus and unprecedentedly large saddle-splay modulus. Thus, when they are confined with specific boundary conditions, e.g., the geometry of confinement and surface anchoring conditions, the LCLCs accordingly exhibit unique director field with defects while minimizing their elastic free energy. In this experiment, we embed a thin glass fiber into nematic LCLCs and investigate the nematic director fields around the fiber. For example, we locate the fiber in the middle of the homogeneously aligned nematic phase with the far-field directors aligned perpendicular to the fiber axis. Presumably, the large saddle-splay elasticity results in the twist deformation along the cell thickness and groups of defects, because it aligns the directors along the fiber axis at the fiber surface. The detailed director fields and the mechanism of defect formation are under investigation. We further plan to study the effect of anchoring conditions, geometry, temperature, and concentrations.