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Lyotropic Chromonic Liquid Crystal Droplets, Faceted and Squeezed[1] ZOEY DAVIDSON, JOONWOO JEONG, MATTHEW LOHR, University of Pennsylvania, PETER COLLINGS, University of Pennsylvania and Swarthmore College, TOM LUBENSKY, ARJUN YODH, University of Pennsylvania — We report on the structures of lyotropic chromonic liquid crystal (LCLC) droplets of spherical, spherocylinder, and faceted shapes dispersed in a background oil phase. The LCLCs phase varies as a function of the mesogen concentration, which in turn changes the elastic properties and the resultant liquid crystal structure. The various director configurations are investigated by brightfield and polarized optical microscopy and are compared with Jones matrix calculations based on model director configurations. In the nematic phase of the LCLC, the spherical droplets exhibit a twisted bipolar configuration with large chiral symmetry breaking as a result of the small twist elastic modulus. As mesogen concentration increases, the LCLCs enter a columnar phase that energetically prefers a pure bend structure and develops facets at high concentrations. Further, we create spherocylinders to study the effects of droplet shape on defect patterns by squeezing droplets into oil-filled capillaries. The observed director configurations reveal a localization of energy of the director field near the topological defects, and they are understood theoretically to be the result of the LCLC's giant elastic anisotropy.

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