

Abstract Submitted
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Drying, phase separation, and deposition in droplets of sunset yellow chromonic liquid crystal¹ ADAM GROSS, ZOEY S. DAVIDSON, University of Pennsylvania, YONGYANG HUANG, Lehigh University, TIM STILL, University of Pennsylvania, CHAO ZHOU, Lehigh University, A.G. YODH, University of Pennsylvania — We investigate the drying process and the final deposition patterns of multi-phase sessile droplets containing aqueous lyotropic chromonic liquid crystal (LC). The experiments employ a variety of optical techniques including profilometry, polarization optical microscopy and optical coherence microscopy. An unusual hierarchical LC assembly is observed during drying; in particular, LC mesogens are first formed at the start of drying and then compartments of isotropic, nematic and columnar phases arise. Nonuniform evaporation creates concentration gradients in droplets such that LC phases emerge from the outer edge of the drop and advance to the center over the course of drying. Distinct outward flows associated with the “coffee-ring effect” are seen initially, but the assembly of the mesogens creates viscosity, density, and surface tension gradients that effectively introduce new convective flows and complex LC phase boundaries within the drop. Finally, we show that the final deposit shape of chromonic materials changes with rate of evaporation.

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