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Phase and Topological Behavior of Lyotropic Chromonic Liquid Crystals in Double Emulsions[1] ZOEY S. DAVIDSON, JOONWOO JEONG, Department of Physics, University of Pennsylvania, FUQUAN TU, Department of Chemical and Biomolecular Engineering, University of Pennsylvania, MATT LOHR, Department of Physics, University of Pennsylvania, DAEYEON LEE, Department of Chemical and Biomolecular Engineering, University of Pennsylvania, PETER J. COLLINGS, Department of Physics and Astronomy, Swarthmore College and Department of Physics, University of Pennsylvania, TOM C. LUBENSKY, A.G. YODH, Department of Physics, University of Pennsylvania — Lyotropic chromonic liquid crystals, assembled by non-covalent interactions, have fascinating temperature- and concentration-dependent phase behavior. Using water-oil-water double emulsions, we are able control the inner droplet chromonic phase concentration by osmosis through the oil phase. We then study the configurations of the chromonic liquid crystal phases in droplets by varying the oil types, oil soluble surfactants, and inner droplet diameter. We employ polarization microscopy to observe resulting nematic and columnar phases of Sunset Yellow FCF, and we deduce the liquid crystal configuration of both phases within the droplets. Simulations based on Jones matrices confirm droplet appearance, and preliminary observations of chromonic liquid crystal shells in oil-water-oil double emulsions are reported.

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