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Title: Morphologies in surfactant-covered liquid crystal nanodroplets

Abstract:
Experiments indicate that a coupling exists between a bulk liquid crystal sample and surfactant molecules. This coupling produces a two-dimensional microphase phase separation of interfacial surfactant molecules, but instrumental limitations have not allowed a structural characterization of the resulting phases. To explore this effect in a spherically-confined environment, we consider Molecular Dynamics simulations of the interfaces of liquid-crystalline nanodroplets covered with surfactant molecules. Surfactant molecules promote local radial anchoring of mesogens within the nanodroplet. Without surfactant, mesogens prefer parallel anchoring with respect to the nanodroplet surface. Upon cooling, a transition from an isotropic to a nematic or smectic ordering of mesogens is observed. The liquid crystal within the droplet induces a structural transition of interfacial surfactant molecules, producing ordered nanophases with morphologies dependent on surfactant concentration. Geometries observed range from circular, to lamellar, to Turing-like patterns.