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Guiding nanocrystal organization within mesoscale lipid thin-film templates[1] DYLAN STEER, YOU ZHAI, NURI OH, MOONSUB SHIM, CECILIA LEAL, Univ of Illinois - Urbana — Recently a great deal of interest has been established in the cooperative intermolecular interactions in hard and soft meso-structured composite materials. Much of this research has focused on the effects of nanoparticle incorporation into block copolymers that otherwise self-assemble into periodic mesostructures through microphase separation. Through careful selection of the polymer components the nanoparticles can be directed to also microphase separate and therefore exhibit symmetry induced by the block copolymers. Such systems are promising for enabling the organization of nanoparticle superstructures. Although this is useful in many applications such as in bottom-up assembly of opti-electronic materials, most of these applications would benefit from interplay between structure and dynamics. Much like block-copolymers, lipids can self-assembly into a variety of structures with 1D lamellar, 2D Hexagonal, and 3D cubic symmetry. However, unlike block-copolymers phase stabilization and conversion from one geometry to another happens under a minute. We will show our recent efforts into using lipid thin films to guide the assembly of nanoparticle superstructures resembling those displayed by lipid polymorphs and how they distort lipid equilibrium phase behavior.

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