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Assembling Nanoparticles at The Isotropic to Nematic Phase Transition SHEIDA T RIAHINASAB, AHMED ELBARADEI, AMIR KESHAVARZ, BENJAMIN STOCKES, LINDA HIRST, University of California, Merced — Liquid crystal (LC) self-assembly allows for the controlled dispersion of quantum dots (QDs), creating new types of material – liquid crystal nanocomposites. Our current research explores the properties of these materials to understand the underlying physics of mixing hard and soft matter. We report the use of a liquid crystal host phase in a new process for the generation of micron-scale, vesicle-like, nanoparticle shells stabilized by ligand-ligand interactions. Mesogenic ligands are used to provide control over the dispersion and stabilization of nanoparticles in liquid crystal phases. The mesogenic ligand's flexible arm structure enhances ligand alignment with the local LC director, promoting QDs dispersion in the isotropic and nematic phases. We have used nuclear magnetic resonance (NMR), polarized optical microscopy and X-ray scattering to characterize QDs dispersion on different length scales. We created a robust shell of controllable size composed of closely packed quantum dots (QDs) and stabilized by local crystallization of the mesogenic ligands.

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