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Towards an optical nano-laboratory in a liquid crystal defect PAUL ACKERMAN, University of Colorado at Boulder, National Renewable Energy Laboratory, Renewable and Sustainable Energy Institute, IVAN SMALYUKH, University of Colorado at Boulder, JAO VAN DE LAGEMAAT, National Renewable Energy Laboratory — Probing photonic effects due to nanoscale interactions between colloids such as quantum dots and rods and anisotropic plasmonic metal nanoparticles is of great interest for applications in third-generation solar cells, optical metamaterials, and nanoantennas. Liquid crystal (LC) structures and defects stabilized by chirality, confinement, and/or presence of colloidal microparticles can enable trapping and well-defined alignment of anisotropic semiconductor, plasmonic, and other nanoparticles with respect to the far-field director and each other. Minimization of the free energy due to LC defects provides a rich environment for precisely controlled experiments with individual and small groups of nanoparticles in the LC. This presentation will discuss characterization of trapping and alignment of various nanoparticles by LC defects and also photonic experiments performed on a single-particle level for metal and semiconductor quantum nanoparticles entrapped by these defects. This work was supported by the Division of Chemical Sciences, Geosciences, and Biosciences, Office of Basic Energy Sciences of the US Department of Energy under Contract No. DE-AC36-08GO28308 with the National Renewable Energy Laboratory (J.v.d.L. and J.S.E.).

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