Abstract Submitted
for the FWS15 Meeting of
The American Physical Society

Quantum dot cluster self-assembly via topological defects in liquid crystal droplet and planar geometries CHARLES MELTON, Univ of California - Merced — Topological defects in nematic liquid crystals are known to drive the assembly of included particles. For example, large colloids have been seen to interact and assemble at defect locations and into colloidal crystals via elastic forces. Similar effects have been observed with nano-sized particles, in particular gold particles and quantum dots. Anchoring conditions affect how the liquid crystal orders around the particle, so using specially designed surface ligands is important. Recently, our research group showed that mesogenic surface ligands allow for self-assembly of well defined structures at the isotropic – nematic phase boundary. For liquid crystals in spherical geometries that possess a well known bipolar configuration we demonstrate that quantum dots co-assemble with the formation of defects upon cooling from the isotropic phase. To further explore this system, a model based on the 2D XY-Model is presented to predict quantum dot placement on the surface of the droplet. We also investigate quantum dot clustering in planar liquid crystal as a function of concentration. Spatial and size controlled patterning of quantum dot clusters could be important in photonic applications such as developing a liquid crystal laser.

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Date submitted: 06 Oct 2015 Electronic form version 1.4