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Optical magnetic shift of a directed assembly of CdSe/ZnS quantum dots and Fe_3O_4 nanopaticles in soft matter at low magnetic fields[1]
JOSE AMARAL, A.L. RODARTE, J. WAN, M.T. QUINT, M. SCHEIBNER, S. GHOSH, University of California, Merced — We are investigating the ensemble behavior of magnetic nanoparticles (MNPs) and CdSe/ZnS quantum dots (QDs) when dispersed in an electro-optically active liquid crystalline (LC) matrix. The directed assembly of NPs in the matrix is driven by the temperature-induced transition of the LC from the isotropic to the nematic phase as the NPs are mostly expelled into the isotropic regions, finally ending up clustered around LC defect points when the transition is complete. Using high-resolution scanning magneto-optical Kerr effect (MOKE), we characterize the spatial distribution and magnetic behavior of Fe_3O_4 MNPs in a room temperature nematic LC, 5CB. Our results show a two-fold intensity increase of QD photoluminescence (PL) intensity with applied fields lower than 200 G. We speculate this increase is due to a reorientation of LC molecules at the edge of the NP clusters causing QDs to coalesce toward the center of the cluster. This work was funded by NSF.

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