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Adjusting the synergistic performance of semiconducting and magnetic nanoparticle co-assemblies[1] MARK BARTOLO, UC Merced, RANDY ESPINOZA, CSU Fresno, JUSSI AMARAL, SAYANTANI GHOSH, UC Merced — A much sought after goal of nanosynthesis is creating artificial materials from self-assembled nano-constituents that would exhibit multifunctionality and *in situ* responsiveness to external stimuli. We are investigating the ensemble behavior of Fe_3O_4 magnetic nanoparticles (MNPs) and CdSe/ZnS quantum dots (QDs) when dispersed in electro-optically active liquid crystalline (LC) matrix. Prior research has demonstrated an enhancement in the QD emission with a small applied magnetic field, a result of synergistic interactions between nanoparticles. Here, we vary the sizes and relative proportions of QDs and MNPs in the assemblies. We aim to determine the limits of sensitivity of the enhanced brightening effect as a function of concentration of MNPs. Using scanning confocal photoluminescence microscopy, we observe that 20 nm MNPs co-assembled with 6 nm QDs exhibit the brightening effect at a dilute limit of 1:100 for MNP:QD, while decreasing the MNP sizes require higher proportions of the latter. Transmission electron microscopy (TEM) provided a structural image of the assemblies. This may be a potential platform for developing high sensitivity, small footprint, and low power magnetic field detectors.

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