

Abstract Submitted
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Ensemble brightening in size purified silicon nanocrystals JOSEPH B. MILLER, AUSTIN R. VANSICKLE, NDSU, REBECCA J. ANTHONY, University of Minnesota, DANIEL M. KROLL, NDSU, UWE R. KORTSHAGEN, University of Minnesota, ERIK K. HOBBIIE, NDSU — We report on the quantum yield, photoluminescence (PL) lifetime and ensemble photoluminescent stability of monodisperse plasma-synthesized silicon nanocrystals (SiNCs) prepared through density-gradient ultracentrifugation in mixed organic solvents. Improved size uniformity leads to a reduction in PL linewidth, band alignment, and the emergence of entropic order in dry nanocrystal films. We find a significant PL enhancement in thin solid films assembled from the fractions, and we use a combination of measurement, simulation and modeling to link this brightening to a temporally enhanced quantum yield arising from SiNC interactions in ordered ensembles of monodisperse nanocrystals. Using an appropriate excitation scheme, we exploit this enhancement to achieve photostable emission.

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