Abstract Submitted
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Anomalous photo-induced spectral changes in CdSe/ZnS quantum dots[1] GEORGIY SHCHERBATYUK, University of California, Merced, RICHARD INMAN, University of California, San Diego, PATRICK TALBOT, SAYANTANI GHOSH, University of California, Merced — We study photo-induced static and dynamic spectral changes in self-assembled CdSe/ZnS quantum dot (QD) thin films with varying QD concentrations under ambient conditions. Using spatially resolved scanning photoluminescence microscopy in conjunction with spectrally resolved time-correlated photon counting, we measure the variations in spectral intensity, emission wavelength, and recombination lifetimes as functions of photo-exposure time. We find that at low concentrations photo-darkening and photo-oxidation rates slow down with increasing QD density, but in the high concentration limit these rates are strongly enhanced. Our measurements lead us to conclude that the interplay of photo-induced surface trap discharging with preferential photo-oxidation of smaller QDs is further modulated by resonant energy transfer driven by strong inter-dot interactions in highly concentrated samples. Finally, we extend our studies to thin films with two different QD diameters to vary the ratio of donors to acceptors and modify the energy transfer efficiency

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