

Abstract Submitted
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Enhanced Fluorescence Blinking of CdSe/ZnS Quantum Dot Clusters MING YU, ALAN VAN ORDEN, Colorado State University — Semiconductor quantum dots (QDs) have been studied for many years to understand their unique, size tunable optical properties, and to investigate their potential applications in optoelectronic devices and biological imaging. In particular, much effort has been devoted to the phenomenon of fluorescence intermittency, or blinking, of individual QDs. In our work, we used spatially correlated single molecule fluorescence spectroscopy and atomic force microscopy (AFM) to study the structures and fluorescence blinking of single CdSe/ZnS core-shell QDs, small ensembles of two or more isolated QDs, and close-packed clusters containing two or more QDs. When multiple isolated QDs were probed simultaneously, the fluorescence behavior was consistent with independent blinking of the particles. However, when close-packed QD clusters were probed, the fluorescence intermittency became much more rapid and intense than could be explained by the summation of multiple particles blinking independently.[1] This suggests when the QDs cluster together, they become electronically coupled in some way that enhances the fluorescence. One possible explanation for this coupling is that the trapping of photoexcited electrons from one or more of the QDs can enhance the fluorescence properties of neighboring QDs by passivating external trap sites available to the neighboring QDs. [1]. Yu, M.; Van Orden, A. Phys. Rev. Lett., Accepted for publication.

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