SPATIALLY RESOLVED SPECTROSCOPIC STUDIES OF SMALL CLUSTERS OF SEMICONDUCTOR NANOCRYSTALS

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Understanding the electronic coupling of closely spaced semiconductor nanocrystals is vital to next generation photovoltaic devices, especially how trapped charges carriers can affect the photophysical properties of the films, how this trapping alters other types of interactions between particles, and how the degree of coupling between particles affects trapping. Using single molecule spectroscopy, we investigated how fluorescence intermittency of semiconductor nanocrystals is affected by proximity to other nanocrystals.[1] The nanocrystal clusters exhibited rapid, intense blinking that was distinct from that of isolated nanocrystals blinking independently (Fig 1). This enhanced blinking is suggested to occur when the nanocrystals in the cluster become electronically coupled through trapped charge carriers. Further studies will reveal how trapped charge carriers affect charge transport through nanocrystalline materials.

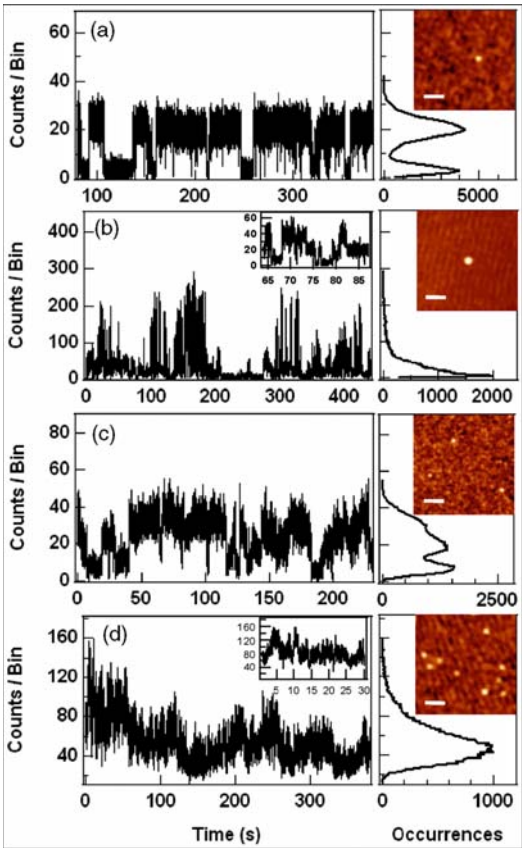

Fig. 1

Fig. 1. Fluorescence trajectory segments (left), photon count histograms (right), and AFM topography images (inset) of (a) a single QD, (b) a QD cluster, (c) three isolated QDs, and (d) multiple isolated QDs probed simultaneously. The AFM images have scale bars of 98 nm and *z* ranges of 8 nm. [1]

References:
1. Ming Yu and Alan Van Orden, Phys. Rev. Lett. **97**, 237402 (2006)