Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Single Molecule Spectroscopy and Scanning Probe Microscopy to Investigate Excited State Energy Transport in Quantum Dot Higher Order Structures[1] ALAN VAN ORDEN, MARTIN GELFAND, DUNCAN RYAN, KEVIN WHITCOMB, Colorado State University — Single molecule fluorescence spectroscopy and scanning probe microscopy have been used to investigate small isolated clusters of CdSe/ZnS nanocrystalline quantum dots dispersed on insulating, conducting, and semiconducting surfaces. The aggregated quantum dots exhibit excited state energy transfer and charge transport which affects the time dependent autocorrelation of the photoluminescence (PL) emission intensity, photon counting statistics, blinking statistics, and PL lifetime, as observed by single molecule fluorescence spectroscopy. The structural arrangement of the nanocrystals and the electron transfer between the quantum dots and substrate can be investigated using atomic force microscopy, transmission electron microscopy, and scanning tunneling microscopy. These combined experiments provide novel perspectives on energy and electron transport in quantum dot higher order structures and the effects of structural arrangements, substrates, and attached ligands. These insights will enhance the development of technological applications of quantum dots, including bioimaging, display technology, and alternative energy technology.

[1]Research supported by NSF Grant 1059089

Alan Van Orden
Colorado State University

Date submitted: 07 Nov 2013 Electronic form version 1.4