Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Single Molecule Studies of Energy Transfer in Semiconductor Nanocrystal Clusters DOUGLAS SHEPHERD, Physics Department, Colorado State University, KEVIN WHITCOMB, Chemistry Department, Colorado State University, PETER GOODWIN, Center for Integrated Nanotechnology, Los Alamos National Laboratory, MARTIN GELFAND, Physics Department, Colorado State University, ALAN VAN ORDEN, Chemistry Department, Colorado State University — Enhanced fluorescence intermittency has been reported in single molecule fluorescence experiments on small clusters of semiconductor nanocrystals[1] (NCs). We report here on studies of small clusters of NCs by single molecule time-correlated single photon counting. According to this analysis, clusters typically blink on a microsecond to millisecond time scale; whereas, isolated NCs blink on a much longer millisecond to second time scale. A fast-decay component in the cluster fluorescence lifetime, not present in single NCs, is correlated with low fluorescence intensity. A model based on nonradiative energy transfer to NCs with smaller bandgap, combined with independent blinking for the NCs in the cluster, accounts for the main experimental features. In this model the smallest-gap NC dominates the emission properties, in particular the "off" time distribution of the cluster, which experimentally resembles that for a single NC. [1] Yu, M. and A. Van Orden, *Enhanced Fluorescence Intermittency of CdSe-ZnS Quantum-Dot Cluster*, Physical Review Letters, 2006 **237402-4**

Douglas Shepherd
Physics Department, Colorado State University

Date submitted: 22 Dec 2009 Electronic form version 1.4