Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Fluorescence from Individual PbS Quantum Dots JEFFREY PETERSON, TODD KRAUSS, University of Rochester — Due to their extremely large electron, hole, and exciton Bohr radii, PbS quantum dots (QDs) can achieve levels of quantum confinement not accessible to III-V and II-VI QDs. Thus, the strong confinement regime is attained for relatively large particles, which may mitigate deleterious surface effects and impart novel properties. PbS QDs are also optically active in the near-infrared region, making these materials potentially useful for telecommunications and biotechnological applications. We will present investigations of single PbS QD fluorescence using far-field microscopy. PbS QDs were synthesized with a size-tunable exciton absorbance ranging between 765 nm and 1800 nm. Of particular note is the ability to synthesize highly luminescent, small radii QDs, allowing for fluorescence detection with high sensitivity silicon CCDs. Upon spincoating QDs onto glass substrates at densities near the single dot level, we observe fluorescence intermittency, or blinking and a narrowing of the fluorescence spectra relative to the ensemble, both hallmarks of single fluorophores. The fluorescence energy irreversibly blue shifts with longer integration times and higher excitation intensities, indicative of a photo-induced degradation. Photobleaching of the majority of PbS QDs occurred in 30 sec. An analysis of the blinking statistics will be discussed.

Todd Krauss
University of Rochester

Date submitted: 01 Dec 2004 Electronic form version 1.4