Fluorescence Resonance Energy Transfer in PbS Nanocrystal Films

STEPHEN CLARK, JEFFREY HARBOLD, FRANK WISE, Cornell University — We report a study of time-resolved photoluminescence of colloidal PbS nanocrystals both in solvent and dried into films. Lifetimes of the PbS nanocrystals in solvent are measured to be around 2.5 microseconds, which is two orders of magnitude larger than expected based on the transition dipole moment. The luminescence spectrum of PbS nanocrystals in the film is red-shifted with respect to the spectrum from the solvent. Spectrally resolving the photoluminescence dynamics of the films clearly shows a decay from the high-energy side of the spectrum, and a rise in the low energy side, on a time scale of around 200 nanoseconds. These measurements provide direct evidence of fluorescence resonance energy transfer in the presence of dielectric screening.