

Abstract Submitted
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Sources of optical transition broadening in room temperature CdSe/ZnS nanocrystal quantum dots¹ MICHAEL WOLF, JESSE BEREZOVSKY, Case Western Reserve Univ — To understand the origins of optical transition broadening in CdSe/ZnS nanocrystal quantum dots (NCQDs) at room temperature, we study the photoluminescence excitation (PLE) spectra of individual NCQDs. The PLE spectra from single NCQDs reveal broadening of the optical transitions and variations of the transition energies between NCQDs. The observed features in the spectra are identified by comparison to transition energies calculated using an 8-band effective mass model. We attribute the broadening to three effects: phonon broadening, spectral diffusion, and size inhomogeneity. The first two mechanisms contribute to the broadening of transitions in single NCQDs. The third mechanism contributes to ensemble broadening. The broadening caused by spectral diffusion and size inhomogeneity both depend on the sensitivity of each transition to variations in the confining potential, leading to linewidths that depend on the particular electron and hole states involved in the transition.

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