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Complete suppression of Blinking and convergence to a single emissive state in giant nanocrystal quantum dots ANTON MALKO, SIDDHARTH SAMPAT, The University of Texas at Dallas, Department of Physics, YOUNG-SHIN PARK, JAVIER VELA, YOUNGFEN CHEN, JENNIFER HOLLINGSWORTH, VICTOR KLIMOV, HAN HTOON, Los Alamos National Laboratory, Chemistry Division and Center for Integrated Nanotechnologies — We report a systematic study of photoluminescence (PL) emission intensities and lifetimes of individual core-shell CdSe/CdS "giant" nanocrystal quantum dots (gNQDs) as a function of the shell thickness. We observed a complete suppression of blinking for gNQDs overcoated with more than 16 monolayers (ML) of CdS shell. An analysis of the photon emission statistics reveals a highly super-Poissonian distribution for thin shell (4-12 ML) gNQDs and near perfect Poissonian distribution for non-blinking, thick-shell gNQDs. Measurements of PL decay rates as a function of PL intensity show that while PL lifetimes vary continuously with PL intensity for thin-shell gNQDs, only one PL decay constant is observed for the thicker shell gNQDs. This result clearly indicates that while the thin-shell gNQDs possess continuous distribution of emission states, PL of the non-blinking, thick-shell gNQDs originates from a single emissive state.

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