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Near-Unity Biexciton Quantum Yields in Individual Giant Nanocrystal Quantum Dots YOUNG-SHIN PARK, Los Alamos National Lab, ANTON MALKO, University of Texas at Dallas, JAVIER VELA, YONGFEN CHEN, YAGNASENI GHOSH, FLORENCIO GARCIA-SANTAMARIA, JENNIFER HOLLINGSWORTH, VICTOR KLIMOV, HAN HTOON, Los Alamos National Lab — We report quantitative studies of photoluminescence (PL) quantum yields of biexcitons (Q_{BX}) in individual CdSe/CdS core/shell nanocrystal quantum dots (NQDs) as a function of shell thickness. Q_{BX}s measured by two independent techniques show a gradual increase with increasing shell thickness, reaching a near-unity value of $\sim$0.9 for the NQDs with a 19 monolayer-thick shell. These results imply a strong suppression of Auger decay. However, Q_{BX}s show a wide variation among nominally identical NQDs implying a strong dependence of Q_{BX} on subtle structural differences of the core/shell interfaces. Surprisingly, despite a wide variation in Q_{BX}, all thick-shell NQDs exhibit a complete suppression of PL blinking, implying that this non-blinking behavior does not result from the suppression of Auger decay and instead may simply arise from a reduced likelihood of photocharging.

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