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Radiative and nonradiative pathways in multiexciton recombination in giant nanocrystal quantum dots ANTON MALKO, SIDDHARTH SAMPAT, The University of Texas at Dallas, HAN HTOON, JAVIER VELA-BECERRA, YONGFEN CHEN, JENNIFER HOLLINGSWORTH, VICTOR KLIMOV, Los Alamos National Laboratory — Recently,[1] we developed "giant" nanocrystal quantum dots (g-NQDs), in which a small emitting core of CdSe is overcoated with a thick shell of a wider-gap CdS. We conduct room-temp measurements of photoluminescence (PL) lifetimes in such g-NQDs as a function of excitation power and a number of shell monolayers. At low pump levels, corresponding to excitation of less than 1 exciton per dot on average ($\langle N \rangle < 1$), we observed excitonic radiative lifetimes of ∼100 ns and a linear scaling of the PL signal with pump intensity. At powers corresponding to $\langle N \rangle > 1$, fast (∼1ns) PL component appeared, accompanied by a transition to a sub-linear scaling of PL intensity with $\langle N \rangle$. Our findings indicate that while g-NQDs indeed produce suppression of nonradiative Auger recombination,[2] this suppression is incomplete. We conduct systematic studies of relative efficiencies of nonradiative and radiative processes in these nanostructures.

[1]Y. Chen et al., *JACS* **130**, 5026 (2008)
[2]F. Garcia-Santamaria et al., *Nanoletters* **9**, 3482 (2009)

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