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The effects of controlled charging on photoluminescence of individual "giant" core/shell nanocrystals CHRISTOPHE GALLAND, YAGNA GHOSH, BHOLA PAL, JENNIFER HOLLINGSWORTH, MILAN SYKORA, VICTOR KLIMOV, HAN HTOON, Los Alamos National Laboratory — We report the first single-nanocrystal photoluminescence (PL) study under controlled charge injection. We investigate so-called "giant" nanocrystal quantum dots (g-NQDs) that comprise a CdSe core and a thick CdS shell. We use solid-state gated devices as well as electrochemical cells for charged injection. When the gate bias or electrochemical potential is tuned, we observe dramatic changes in the PL dynamics that are accompanied by spectral shifts and intensity modulations. Our initial results suggest that negatively charged excitons are at least as bright as neutral excitons in these g-NQDs for which Auger recombination has been shown to be strongly suppressed. Surprisingly, hole injection leads primarily to quenching of the NQD emission, which might explain the appearance of "gray" or "dark" periods in the single-dot PL trajectories.

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