Photodarkening of blinking quantum dots is not governed by Auger recombination

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Abstract

The observed intermittent light emission from colloidal semiconductor nanocrystals has long been associated with Auger recombination assisted quenching. We test this view by observing transient emission dynamics of CdSe/CdS/ZnS semiconductor nanocrystals using time-resolved photon counting. The size and intensity dependence of the observed decay dynamics are inconsistent with the those expected from Auger processes. Moreover, the data suggests that in the 'off' state the quantum dot cycles in a three-step process: photoexcitation, rapid trapping and subsequent slow nonradiative decay.