

Abstract Submitted
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Assessment of carrier multiplication in semiconductor nanocrystals by transient photoluminescence spectroscopy GAUTHAM NAIR, SCOTT GEYER, MOUNGI BAWENDI, Massachusetts Institute of Technology — The enhancement of carrier multiplication (CM) is an important aim that could increase solar cell performance and widen the range of materials suitable for future solar technologies. Pump-probe measurements have shown evidence of strongly enhanced CM in lead chalcogenide, InAs, and CdSe nanocrystals (NCs). However, the nature of the enhancement mechanism is not well understood. We have carried out an experimental assessment of CM yields in semiconductor NCs by carefully studying exciton and biexciton signatures in transient photoluminescence decays. In the case of CdSe NCs, though the technique is particularly sensitive due to the biexciton's relatively fast radiative rate, we have found no evidence for CM up to photon energies as high as $3.1 E_g$. This result is strongly in disagreement with previous reports on CM in CdSe NCs. The implications of our findings on the efficiency and material dependence of CM are discussed within a general physical framework.

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