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Multiple exciton generation in films of chemically treated lead chalcogenide quantum dots JOSEPH LUTHER, NREL, MATTHEW BEARD, JAMES MURPHY, RANDY ELLINGSON, MATT LAW, KELLY KNUTSEN, ARTHUR NOZIK — Multiple exciton generation (MEG) is a unique process, which allows nanocrystals to produce several electron-hole pairs if the excitation energy is high compared to the bandgap of the material. Although the exact process that occurs in MEG is still under debate, the existence of the phenomenon is proven for quantum dots (QDs) in solution. This unique process leads to a desire to fabricate photovoltaic devices, among other things, which would benefit from the enhancement in photocurrent produced at short wavelengths. The fabrication of devices is problematic because the QDs must be close enough for charge transport to occur, yet remain confined for the process of MEG. In our work, we discuss how the exciton dynamics including MEG are affected by assembling the QDs into neat ordered arrays using transient absorption spectroscopy. The inter-QD distance is varied by treating the as-prepared array in dilute solutions of short-chained amines.

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