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Fast exciton relaxation and multiple exciton generation (MEG) in semiconductor nanocrystals: the role of defects CHRISTOPHE DELERUE, GUY ALLAN, IEMN-ISEN — Recent works have concluded that a single high-energy photon could generate multiple excitons in semiconductor nanocrystals but these results are debated and are not well understood theoretically. More generally, the physics of the relaxation of excitations in semiconductor nanocrystals receives growing interest. We show that surface defects must play an important role in these processes. We calculate the rate for the relaxation of hot carriers by impact ionization and we show that the presence of surface defects leads to an increase of the relaxation rate at lower excitation energy. We present simulations of the carrier multiplication in Si nanocrystals and we discuss the results of recent experiments in light of these results.

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