

Abstract Submitted
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Coherent Superposition of Multi - Exciton Complexes in Semiconductor Nanocrystals ANDREW SHABAEV, ALEXANDER EFROS, Naval Research Laboratory — Very efficient multi-exciton generation has been recently observed in nanocrystals where an optically excited electron-hole pair with an energy greater than the bandgap (E_g) produces one or more additional electron-hole pairs [1,2]. We present a theory of multiple exciton generation in nanocrystals. We have shown that very efficient and fast exciton generation in nanocrystals occurs by the optical excitation of a coherent superposition of multi-exciton states by a single photon. This model explains ultrafast dynamics of optical bleaching that arises from state filling including quantum beats between the multi-exciton states. We have also shown that although highly efficient multiple exciton generation begins at photon energy $3E_g$, the threshold of multiple exciton generation is $2E_g$ not, $3E_g$ as was suggested previously.

1. R. Schaller and V. Klimov, Phys. Rev. Lett. **92**, 186601 (2004).
2. R. J. Ellingson, M. C. Beard, P. Yu, O. I. Micic, A. J. Nozik, A. Shabaev, and Al. L. Efros, submitted.

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