

Abstract Submitted
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Polarization and orientation effects on energy transfer in semiconductor nanocrystals.¹ AMEENAH N. AL-AHMADI, SERGIO E. ULLOA, Ohio University — We study the effect of the orientation factor on coherent energy transfer from a donor to an acceptor quantum dot. We calculate the polarization of the acceptor dot as a function of incident light polarization in resonance with different donor levels. We demonstrate that the measurement of the acceptor polarization can be used to obtain information on the relative orientation between the donor-acceptor pair. We use the density matrix to study the dynamics of the luminescence polarization of the QDs in the Lindblad approximation [1]. We use a realistic model of the exciton levels and the oriented dipole transition of each level to predict the importance of the orientation factor on the energy transfer in semiconductor nanocrystals. We consider the band edge fine structure of the exciton in the QDs based on an effective mass description with eight exciton levels [2]. Our results show strong dependence of the polarization of the acceptor dot on the relative orientation between the donor-acceptor pair and the specific donor state under excitation.

[1] A.N. Al-Ahmadi and S.E. Ulloa, Phys. Rev. B 70, 201302(R) (2004).

[2] A.I.L. Efros and M. Rosen, Ann. Rev. Mater. Sci. 30, 475 (2000).

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Sergio Ulloa
Ohio University

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