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Effective Nonradiative Energy Transfer Between Nanocrystal Bilayers Enhanced by 1,6-Hexanediamine Linkers MICHAEL NIMMO, ERICK GONZALEZ, NIELS RAMAY, OLIVER SEITZ, YVES CHABAL, ANTON MALKO, University of Texas at Dallas — Nanostructured materials attract great interest as candidates for producing new, practical photoelectronic devices. Many current devices are based on charge-transfer in which primary photoexcitations are separated into an electron and hole on different sides of the interface. Poor interface quality and carrier transport are issues that result in a lower conversion efficiencies than in inorganic crystalline devices. An alternative is given by non-radiative energy transfer (NRET) based hybrid nanostructures, which combine strongly absorbing components such as nanocrystal quantum dots (NQDs) and high-mobility semiconductor layers. In this work, we compared the effectiveness of 1,6-hexanedithiol vs. 1,6-hexanediamine to link multilayer NQD structures. Steady state photoluminescence (PL) measurements showed that using 1,6-hexanediamine consistently resulted in higher PL counts and passivation of the NQDs. Furthermore, we studied bilayer structures of different size NQD layers (565NQDs on 605NQDs) linked with 1,6-hexanediamine. We performed time-resolved and steady-state PL measurements to quantify the NRET rates between the 565NQD layer and the 605NQD layer. NRET rates were consistently 91%. Hence, we foresee the utilization of bilayer NQD structures linked with 1,6-hexanediamine in energy transfer-based systems.

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