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Studying the Photoexcitation Quenching Mechanism in Quantum Dot-Nitroxide Radical Hybrid Sytems POULAMI DUTTA, JEFFREY SAYEN, REMI BEAULAC, Michigan State University — The study of energy/electron transfer processes in inorganic/organic complexes is an active area of research, with applications in fields ranging from energy conversion to chemical catalysis. A really interesting variation of this is the use of colloidal semiconductor nanostructures as one of the donor and/or acceptor units; since this area has remained quite unexplored. In the present work, nitronyl- and imino-nitroxide organic free radicals have been synthesized and coupled to colloidal II-VI quantum dots (QDs). The nature of the donor-acceptor interactions in these QD-radical hybrids has been investigated using spectroscopic techniques such as ground state UV-Vis absorption, steady-state and time-resolved photoluminescence(PL) spectroscopy. In all cases, these radicals quench the Luminescence intensity from the photo-excited QDs through an efficient non-radiative process. The excited-state quenching rate constant is highly dependent on parameters like QD size and composition, the identity and concentration of the organic free radical, and the nature of the medium surrounding the QDs. The quenching rates can be further correlated to the surface-binding sites on the QDs and can also be tuned by modifying the nature of the QD surface by growing different QD hetero-structures.

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