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Effect of mesogenic ligands on short and long-term spectral stability of CdSe/ZnS quantum dots[1] JOSE AMARAL, University of California, Merced, EDWIN BETADY, University of California, Riverside, MAKIKO QUINT, DENZAL MARTIN, SHEIDA RIAHINASAB, LINDA HIRST, SAYANTANI GHOSH, University of California, Merced — Surface modification of chemically synthesized CdSe/ZnS quantum dots (QDs) by performing a ligand-exchange can improve the optical properties, including short- and long-term photo-stability. Using a custom-designed mesogenic ligand, we significantly and advantageously alter the photophysical properties of CdSe/ZnS core-shell QDs. Our investigation is two-fold, as we follow the effect of ligand exchange on (1) the static and dynamic photoluminescence (PL) properties of QDs under continuous illumination, and (2) the temperature dependence of PL. We find that a reduction in Forster resonance energy transfer due to the ligand exchange process results in stabilizing both recombination lifetimes and emission intensity for over an hour of high power photo-excitation. Our temperature-dependent PL studies indicate thermally activated PL recovery at higher temperatures, and a lack of emission enhancement at low temperatures resulting from greater charge separation by the mesogenic ligands. We conclude that this process improves photoluminescence stability and sample longevity of QD films whose applications require long term resistance to photobleaching.

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jose amaral
University of California, Merced

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