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Particle Morphology and Interfacial Energy Transfer in CdSe/CdS Nanocrystals NICHOLAS BORYS, MANFRED WALTER, University of Utah, JING HUANG, DMITRI TALAPIN, University of Chicago, JOHN LUPTON, University of Utah — CdSe/CdS core-shell nanocrystal heterostructures are unique systems to study nanoscale energy migration. We perform single-particle excitation spectroscopy at low temperatures by monitoring both the luminescence intensity and energy of the core as a function of optical excitation energy in three different heterostructure shapes: spherical particles, rods, and tetrapods. In the tetrapod and rod structures, the shapes of the PLE spectra fall into one of two classes while the spherical particles all exhibit one universal form, which we attribute to the general shape and quantum confinement symmetry of the CdS shell. We confirm this assignment by correlated single particle SEM and PLE measurements. By resolving the core emission energy as a function of excitation energy, we identify two distinct exciton species in the tetrapods indicating the presence of a barrier that prevents charge transfer across the heterostructure interface [1].

[1] Borys et al., Science (in press)

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