

Abstract Submitted  
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**Enhanced Emission of Nanocrystal Solids Featuring Charge-Separated Excitons.** NATALIA KHOLMICHEVA, BGSU, DANIEL GAMELIN, University of Washington, MIKHAIL ZAMKOV, BGSU — Solution processing of semiconductor nanocrystal (NC) solids represents an attractive platform for the development of next-generation optoelectronic devices, which excitonic character enables a unique optical, electrical, and thermal behavior. In search for an enhanced light-emitting performance, nanocrystal solids are typically designed to have large interparticle gaps that minimize the exciton diffusion to dissociative sites. This strategy, however, causes a nanoparticle film to become electrically insulating, making the injection of charges inefficient. Here, we demonstrate that the exciton diffusion in light-emitting nanocrystal solids can be suppressed without compromising their electrical conductivity by using a judiciously designed core/shell nanocrystal morphology. Our study shows that solids comprising type II heterostructured nanocrystals (ZnSe/CdS) exhibit an intrinsically slower exciton diffusion to recombination centers than films composed of type I nanoparticles (CdSe/CdS). As a result, type II NC assemblies promote longer exciton lifetimes ultimately leading to a brighter emission. The slower propagation of excitons through type II solids is consistent with a reduced overlap between absorption and emission spectral profiles in these materials (large Stokes shifts), which results in a decreased FRET rate. We expect that the enhanced emission of type II nanocrystal assemblies can benefit the development of nanocrystal-based light-emitting technologies.

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