

Abstract Submitted
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**Photovoltaic Device Performance Enhancement by Interfacial
Decoration of Bulk-Heterojunctions with Semiconducting Nanocrystals**

THEODORE J. KRAMER, IOANNIS KYMISSIS, IRVING P. HERMAN, Columbia University — We have developed a facile method for decorating the donor-acceptor interface of organic bulk-heterojunctions (BHJs) with semiconducting nanocrystals (NCs). Using nano-scale phase separation of a poly(3-hexylthiophene)/polystyrene copolymer blend, followed by selective removal of the polystyrene, we are able to expose a nano-scale network of poly(3-hexylthiophene) [P3HT] fibers. These fibers are subsequently decorated with cadmium selenide (CdSe) NCs prior to back filling the structure with thermally evaporated C₆₀. Optical characterization techniques have confirmed that NCs located at the donor-acceptor interface show enhanced charge transfer to the surrounding medium compared to NCs randomly dispersed in similar BHJs. Photovoltaic (PV) devices made using this technique show improved external efficiencies compared to similar planar PV structures. This technique provides an elegant mechanism for improving the performance of organic BHJs by tailoring their spectral absorption using semiconducting NCs.

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