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Photo-physics of P3HT blended with highly enriched metallic and semiconducting single-walled carbon nanotubes JOSH HOLT, KEVIN MISTRY, ANDREW FERGUSON, JEFF BLACKBURN, NIKOS KOPIDAKIS, GARRY RUMBLES, National Renewable Energy Laboratory — Single-walled carbon nanotubes (SWNTs) possess unique properties that may potentially benefit photovoltaic (PV) devices, including high carrier mobilities, convenient work functions, and tunable optical transitions that span most of the solar spectrum. However, significant polydispersity in both diameter and electronic structure have hindered the realization of efficient PV cells incorporating SWNTs. In this presentation, we report the use of advanced techniques to separate single-walled carbon nanotubes (SWNTs) created by laser vaporization into highly enriched semiconducting and metallic species. The enriched SWNTs are then blended with regioregular poly(3-hexylthiophene) (P3HT) to serve as a model electron donor/acceptor system, analogous to systems typically used in organic PV devices. We investigate the photophysical properties of charge generation and transfer using primarily time-resolved microwave conductivity (TRMC) and photoluminescence excitation spectroscopy and discuss the disparities between metallic vs semiconducting SWNT acceptors.

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