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Optimizing Efficiency in Conducting Polymer/Singlewalled Carbon Nanotube Hybrids for Organic Photovoltaics JOSH HOLT, Chemical & Materials Science Center, National Renewable Energy Laboratory, 1617 Cole Blvd., Golden, CO 80401 (USA), FRITZ PREHN, Department of Materials Science and Engineering, University of Wisconsin-Madison, 1509 University Ave., Madison, WI 53706 (USA), MARTIN HEENEY, Department of Chemistry, Imperial College London, South Kensington, SW7 2AZ, UK, NIKOS KOPIDAKIS, GARRY RUMBLES, JEFFREY BLACKBURN, Chemical & Materials Science Center, National Renewable Energy Laboratory, 1617 Cole Blvd., Golden, CO 80401 (USA) — Several unique properties of singlewalled carbon nanotubes (SWCNTs) have motivated their investigation as potential replacements for fullerene derivatives as the acceptor phase of organic photovoltaic (OPV) devices. Although replacement of the ubiquitous fullerene acceptors by SWCNTs in OPV devices has shown limited success thus far, better understanding of charge transfer between SWCNTs and conjugated polymers has promoted its viability. We provide experimental evidence that m-SWNTs limit the generation efficiency and lifetime of the charge-separated state in these composites. We also probe the photo-carrier generation and decay dynamics in poly(3-hexylthiophene) (P3HT) paired with a broad diameter range of SWCNTs. We witness electron transfer from the polymer to SWCNT and *selective* hole transfer from the SWCNT to polymer by varying the nanotube HOMO via its diameter. We finally extend our investigation Josh Holt to additional semi-conducting polymers that have contributed to high OPV efficiencies, pBTTT and PCDTBT Energy Laboratory, 1617 Cole Blvd., Golden, CO 80401 (USA)

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