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Free Carrier Dynamics in Photoexcited Semiconducting Carbon Nanotube / C_{60} Planar Heterojunctions DOMINICK BINDL, MENG-YIN WU, University of Wisconsin - Madison, ANDREW FERGUSON, NIKOS KOPIDAKIS, JEFFREY BLACKBURN, National Renewable Energy Laboratory, MICHAEL ARNOLD, University of Wisconsin - Madison — Semiconducting single walled carbon nanotubes (s-SWCNTs) have remarkable photophysical properties and are appealing for use as principal absorbers in photovoltaics. We have previously demonstrated the collection of photocurrent from thin s-SWCNT films with efficiencies approaching 100% at C_{60} interfaces. Exploiting this interface in high efficiency photovoltaics requires collecting free carriers from optically dense s-SWCNT/C_{60} films with negligible recombination losses, and therefore, an understanding of free carrier recombination kinetics and mechanisms. Time resolved microwave conductivity (TRMC) is a technique which monitors free carrier generation and decay transients in response to a spectrally tunable pump. Here, we report TRMC studies of free carrier dynamics in s-SWCNT thin films and in heterojunctions with C_{60}. We have found that free carrier generation yields increase by nearly an order of magnitude and lifetimes increase up to 850ns following introduction of a C_{60} interface, with free carrier lifetimes and generation yields strongly dependent on excited s-SWCNT diameter. We discuss yields, kinetics, and provide insight into relevant charge transfer and recombination mechanisms.

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