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Carbon Nanotubes for Polymer Photovoltaics ANNICK ANCTIL, ROBERTA DILEO, CHRIS SCHAUERMAN, BRIAN LANDI, RYNE RAFFAELLE, NPRL-R.I.T. — Carbon nanotubes are being investigated for optical absorption, exciton dissociation, and carrier transport in polymer photovoltaic devices. In the present work, single wall carbon nanotubes (SWNTs) were synthesized by an Alexandrite pulsed laser vaporization reactor at standard conditions and purified based upon our previously reported TOP procedure. The SWNTs were dispersed in polymer composites for pure MEH-PPV, pure P3HT, and [C60]-PCBM-P3HT (1:1 by weight) as a function of nanotube weight loading (0.1 – 5% w/w). The AM0 current-voltage measurements for structures sandwiched between PEDOT/PSS coated ITO substrates and an evaporated aluminum contact demonstrate the dramatic effect of SWNT content on the short circuit current density, with conversions efficiencies consistently greater than 1%. The temperature coefficient for nanotube-containing polymer photovoltaics has been compared to conventional PCBM-P3HT devices, and the general relationship of increasing efficiency with increasing temperature is observed. However, the necessity to control nanotube percolation to prevent device shunting has led to recent developments which focus on controlling nanotube length through oxidative cutting, the deposition of intrinsic polymer layers, and the use of aligned carbon nanotube arrays for preferential charge transport.

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