DEPARTMENT of PHYSICS and ASTRONOMY
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

Condensed Matter / Materials Seminar

# Organic Electronics Using Nanocomposites

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## Abstract

Single-walled carbon nanotubes (SWNT)-conjugated polymer, matrix nanocomposites based on poly(3-octylthiophene) (P3OT), poly(2-Methoxy-5-(2'-Ethyl-Hexyloxy)-p-PhenyleneVinylene) (MEH-PPV), and poly(9,9-dioctylfluorene) (PFO) hosts, have been investigated for use in thin film organic photovoltaic cells. Device performance for the three nanocomposites is based upon a standard multilayered device structure (anode/buffer layer/active layer/buffer layer/cathode). The devices were tested by collecting current voltage (IV) characteristics under dark and illuminated (a simulated AM1.5g standard) conditions. Utilizing relatively low concentrations (> 1% by weight) of nanotubes, the MEH-PPV and P3OT hosts exhibited significant enhancements in overall performance. However, PFO-based devices clearly exhibit a lowering in operating efficiency and decrease in short circuit current. The overall performance features of the devices can clearly be interpreted in terms of hole injection mechanisms at the nanotube/polymer interface. Simialrly, in organic light emitting diodes, enhancements in the overall performance can be directly correlated to nanotube-host interactions. OLEDs based on PPVs and PFOs have both exhibited enhanced lifetimes and increased efficiencies at high currents. These findings coupled with recent advances in the doping of carbon nanotubes has allowed for their expanded use in a number of organic device applications.

Time: 1:30pm, Thursday, 14 Nov 02
Place: Room 258 Phillips Hall