



~~~~ Polymer Physics Seminar ~~~~

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301 Steidle Bldg.

Structured Poly(thiophene)/Carbon Nanotube Thin Films for Organic Photovoltaic Applications

Organic Photovoltaics (OPVs) are intended to contribute towards the low-cost, low energy segment of the electronics market. Despite the progress in the field, OPV efficiencies have recently stagnated around 5%, owing mainly to the standardized cell fabrication process that involves solution deposition of the polymer followed by annealing. As a result, the crystals of a commonly used polymer, poly-3-hexylthiophene (P3HT), align in the undesired perpendicular orientation (100) with respect to the substrate. This orientation stems from the preferential specific interactions between the solubility enhancing side chain and the substrate.

Electropolymerization is used not only to orientation of the crystals in the desired (010) direction, but also to minimize the side-chain length which in common OPVs serves no purpose once the polymer film has been deposited. Moreover, composite films of Carbon Nanotube/P3HT films are synthesized using this method, and characterized using raman spectroscopy, UV-vis spectroscopy, and Photoluminescence spectroscopy to study the influence of CNTs on charge transfer from the polymer phase into the CNT phase.

Electronic properties of the electropolymerized P3HT, like resistivity, will also be discussed briefly. However, such properties are subject to impurities such as electrolytes, which are invariably incorporated into the polymer films during the polymerization. Efforts towards expelling such impurities will be addressed.