



~~Special Polymer Physics Seminar ~~

Professor Chris Collison

Department of Chemistry
NanoPower Research Laboratory
Rochester Institute of Technology
Rochester, NY 14623-5603

**10:00 AM Tuesday,
February 1st, 2011
301 Steidle Bldg.**

Strategies for improved efficiency and sustainability of bulk heterojunction organic photovoltaic devices

Organic photovoltaic devices promise low-cost, flexible options for future renewable energy. Yet there are two major problems that face their successful commercialization: 1) Their efficiencies are currently too low compared to other photovoltaic technologies and 2) the continued use of materials used in these devices such as Indium Tin Oxide (ITO) may be unsustainable.

In order to improve device efficiency we must understand the mechanism of operation of these “bulk heterojunction” photovoltaics. A brief overview of the mechanism for operation will be provided. I will then talk about one strategy to increase device efficiency through a broader spectral overlap between the device absorbance and the solar spectrum. I will describe a number of characterization techniques (e.g. cyclic voltammetry, fluorescence lifetime) of potential new materials such that their candidacy for effective use can be properly determined.

One approach to replacing ITO as the transmissive conducting layer is to use thin films made of single-walled carbon nanotubes (SWCNT). SWCNT also offer options for the active layers of bulk heterojunction devices. Yet SWCNT cannot be easily spin- or spray-coated because their dispersions in a variety of solvents are unstable. I will present fluorescence quenching measurements used to investigate the fundamental understanding of interactions between organic materials and SWCNT. The goal is to find more appropriate surfactants such that SWCNT dispersion limits are increased and hence SWCNT manipulation is improved.