



WEEKLY CALENDAR

14 November 2005

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Materials Science & Engineering Seminar

3:40PM / Wednesday, 16 November 2005 / Room E-130, Howe-Russell

Organic Thin Film Electronics: A Materials Science Perspective

C. Daniel Frisbie, PhD

Department of Chemical Engineering & Materials Science
University of Minnesota

In the last 15 years substantial progress has been made in the development of p-conjugated organic semiconductor materials as an alternative to amorphous silicon for low cost, thin film electronics. The attractive properties of organic semiconductors - low temperature processability, efficient electroluminescence, and reasonable charge carrier mobilities - have led to expectations of a new 'plastic' electronics with applications ranging from flexible flat panel displays and smart cards to energy efficient lighting and low cost solar cells. The ultimate success of plastic electronics depends on many factors, some technological and some economic. However, from a materials engineering standpoint, there is a need for further performance improvements and achieving this depends upon a comprehensive understanding of structure-property relationships in organic semiconductors. This talk will describe multi-investigator efforts at Minnesota to develop crystalline organic semiconductors for thin film transistors (TFTs) and to understand structure-transport relationships in these devices with an eye toward further improvements. We have developed a four-pronged strategy for the optimization of OTFTs, namely (1) synthesis of new semiconducting materials; (2) fabrication and testing of OTFT devices; (3) visualization of charge transport bottlenecks by high resolution scanning probe methods; and (4) experimental and theoretical determinations (with Jean-Luc Bredas at Georgia Tech) of electronic structure. This talk will touch on each of these components and will emphasize recent success we have had in developing new n-channel organic semiconductors. Topics covered will include semiconductor film growth, structure characterization by X-ray diffraction and atomic force microscopy, device I-V characteristics, stability, carrier trapping, and O₂/H₂O sensitivity. We will also compare the performance of our materials to the current benchmarks, pentacene and poly(3-hexylthiophene). A recurrent theme is the effect of structure at all length scales - including molecular structure, crystal packing, and film morphology - on critical OTFT parameters such as the charge mobility, the threshold voltage for conduction, and the on-to-off current ratio.

General Seminar

3:40PM / Thursday, 17 November 2005 / Room 109, Nicholson Hall

Host: Drs. John DiTusa and Luis Lehner

[Refreshments served at 3:15 PM in Room 229, Nicholson Hall]

Advances in Neutron Star Astrophysics

Lars Bildsten, PhD

Kavli Institute
University of California-Santa Barbara

Special Announcement:

Chancellor Sean 'O'Keefe is scheduled to visit with the students in the Department of Physics and Astronomy, on Tuesday, November 29th, in Room 109 Nicholson. Students will be allowed to voice any concerns and have a one-on-one question/answer session with the Chancellor.