



## **DR. FRANKY SO**

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### **INTERFACE EFFECT AND BULK CARRIER TRANSPORT IN ORGANIC PHOTOVOLTAIC CELLS**

Organic photovoltaic cells are attractive for the next generation photovoltaics because of their compatibility with flexible substrates and low manufacturing costs. In this presentation, we will show our recent results on interface effects and bulk carrier transport in organic bulk heterojunction small molecule and polymer bulk heterojunction solar cells. For interface effect study, we have studied the effect of molybdenum oxide interlayer at the ITO electrode on solar cell performance. The power conversion efficiencies of small molecule cells with the molybdenum oxide interlayer were enhanced by a maximum of 38% due to a significant enhancement in the fill factor. The improved fill factor is attributed to the reduction of series resistance. Our ultraviolet photoemission spectroscopy data indicate the strong band bending and the built-in field at the oxide interface leads to enhancement in hole extraction towards the anode. For carrier transport study, we have carried out CELIV and photoconductivity measurements on different polymeric bulk heterojunction cells to determine the factors limiting the cell efficiency. The results of our measurements indicate that the low carrier mobility, imbalance of carrier transport and low charge separation efficiency are responsible for the low cell efficiency in some of the cells.

Dr. Franky So received his B.A degree in physics from Hamilton College, M.S. in materials science from MIT and Ph.D. in electrical engineering from the University of Southern California. After his graduation in 1991, he was a research scientist at Hoechst Celanese Corporation working on high speed polymer electro-optical modulators and organic light emitting devices (OLEDs). In 1993, he joined Motorola Phoenix Corporate Laboratories working on OLEDs for flat panel displays. He was then promoted to be the Program Manager responsible for the R&D activities in OLED technology development. During his tenure at Motorola, he received the Distinguished Innovator Award and the Master Innovator Award. In 2001, he joined OSRAM Opto-Semiconductors and became the Head of Materials and Devices Research. He had the worldwide responsibility managing the R & D activities in OLEDs for flat panel displays and solid state lighting. In summer 2005, he joined the faculty in the Department of Materials Science and Engineering at the University of Florida. He is now currently an Associate Professor in the Department. Dr. So holds over 70 patent applications in the area of organic electronics. Dr. So is a Fellow of SPIE and a Senior Member of IEEE.

**Host:**  
**Professor**  
**Jinsong Huang**  
**Mechanical Eng.**

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**Wednesday, March 10, 2010**  
**237 Scott Engineering Center**  
**1:30 p.m.**