Texas A&M University Nano/Micro Seminar Series Presents:

Towards Low-Cost, High Efficiency, and Scalable Organic Solar Cell Fabrication with Nanoimprinted Transparent Metal Electrode and Improved Domain Morphology

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Room 101 RICH

Abstract

I will review our recent progress towards realizing future low-cost, high efficiency and scalable organic solar cells. Firstly, we show that the transparent electrodes based on metallic nanostructure is a strong candidate as a replacement of conventional ITO electrodes due to their superior properties, such as high optical transparency, good electrical conductivity and mechanical flexibility. Furthermore, we exploited the unique optical properties due to the excitation of surface plasmon resonance (SPR) by the metallic nanogratings to enhance the light absorption of organic semiconductors in a bilayer solar cell structure, and demonstrated enhanced power conversion efficiency than devices made using ITO electrodes. In addition, we also investigated a new device fabrication process with a focus on the photoactive layer formation, which produces the most optimum bulk heterojunction morphology compared with other conventional annealing based-methods. Finally, we demonstrate that these approaches are potentially scalable to large area and high speed roll-to-roll processes, which represents one step forward to realizing low cost, high efficiency and large area organic solar cells. These work used extensively the nanoimprint technique, which I will also discuss in this presentation.

Biography

L. Jay Guo received his B.S. in physics from Nankai University in 1990, and his MS and Ph.D. in electrical engineering from the University of Minnesota in 1995 and 1997 respectively. He was a research associate at Princeton University from 1998-1999. He joined the Department of Electrical Engineering and Computer Science at the University of Michigan, Ann Arbor in 1999, and is currently an associate professor of electrical engineering and computer science, applied physics, and macomolecular science and engineering. He has served on many international conference program committees related to nanotechnologies and photonics, including symposium chair of two MRS topical conferences on printing methods for electronics, photonics and biomaterials. His research areas include polymer-based photonic devices and sensor applications, plasmonic nanophtonics, organic electronics and photonics, nanoimprint-based nanomanufacturing technology and applications.

If you have a question regarding this seminar, please contact Arum Han, arum.han@ece.tamu.edu.

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