Hybrid Inorganic/Organic Systems for Opto-Electronics

Collaborative Research Centre 951

Special Colloquium Announcement

of the Collaborative Research Centre 951
"Hybrid Inorganic/Organic Systems for Opto-Electronics"

Seth R. Marder

School of Chemistry and Biochemistry, School of Materials Science and Engineering, and Center for Organic Photonics and Electronics, Georgia Institute of Technology, USA

Interface Chemistry for Organic Electronics and Opto-electronics

Time: Thursday, March 01, 2018, 3 p.m. **c.t.**

Place: IRIS Adlershof, Zum Großen Windkanal 6, Room 007 (ground floor).

Collaborative Research Centre 951
Department of Physics
Humboldt-University of Berlin

Email: sfb951@physik.hu-berlin.de
Tel.: +49 30 2093 66374
www.physik.hu-berlin.de/sfb951

Partners

Interface Chemistry for Organic Electronics and Opto-electronics

Seth R. Marder

School of Chemistry and Biochemistry, School of Materials Science and Engineering, and Center for Organic Photonics and Electronics,Georgia Institute of Technology, USA

Organic semiconductors have attracted interest for electronic applications due to their potential for use in low-cost, large-area, flexible electronic devices. Here we will report on recent developments pertaining to surface modifiers and dopants that could impact the charge injection/collection processes in organic light emitting diodes, organic field effect transistors, and organic photovoltaic devices. In particular, we will examine how phosphonic acids assemble on ITO substrates, the impact of the surface dipole on the work function of the ITO and electron transfer kinetics across surface modifiers. We will also discuss the development of metallocenes-based dimers as n-dopants and very briefly described metal dithiolene complexes as p-dopants for organic semiconductors and their impact of device performance.

Selected References:

1. "n-Doping of Organic Electronic Materials using Air-Stable Organometallics," *Adv. Mater.* **24** (5), 699-703 (February 2012, DOI: 10.1002/adma.201103238)
2. "Spatially modulating interfacial properties of transparent conductive oxides: Patterning work function with phosphonic acid self-assembled monolayers," *Adv. Mater.* **24** (5), 642-646 (February 2012, DOI: 10.1002/adma.201102321)
3. "Solution doping of organic semiconductors using air-stable n-dopants." *Appl. Phys. Lett.* **100**, 083305 (February 2012)
4. "A universal method to produce low work function electrodes for organic electronics," *Science* **336** (6079), 327-332 (April 2012, DOI: 10.1126/science.1218829)
5. "The modification of indium tin oxide with phosphonic acids: Mechanism of binding, tuning of surface properties, and potential for use in organic electronic applications." *Acc. Chem. Res.* **45** (3), 337-346 (May 2012)
6. "Ultralow doping in organic semiconductors: Evidence of trap filling." *Phys. Rev. Lett.* **109** (17), 176601/1-5 (November 2012, DOI: 10.1103/PhysRevLett.109.176601)
7. "Reduction of contact resistance by selective contact doping in fullerene n-channel organic field-effect transistors." *Appl. Phys. Lett.* **102**, 153303-153307 (April 2013, DOI: 10.1063/1.4802237)
8. "Orientation of phenylphosphonic acid self-assembled monolayers on a transparent conductive oxide: A combined NEXAFS, PM-IRRAS, and DFT study," *Langmuir* **29**, 2166-2174 (February 2013, DOI: 10.1021/la304594t)
9. "Production of Heavily n- and p-Doped CVD Graphene with Solution-Processed Redox-Active Metal-Organic Species," *Materials Horizons* Advance Article (September 2013, DOI: 10.1039/C3MH00035D)
10. "ITO Interface Modifiers Can Improve V_{oc} in Polymer Solar Cells and Suppress Surface Recombination*J. Phys. Chem. Lett.* **4** (23), 4038-4044 (November 2013, DOI: 10.1021/jz4021525)