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THE ECE SPEAKER SERIES



New Materials for Printed Opto-Electronic Devices:
Synthesis, Charge Transport, and Process Engineering

February 10th, 11am – 1pm

Location: SEC 104

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Printed opto-electronics is a new technology envisioning the fabrication of opto-electronic devices using printing methodologies. In this presentation I will describe the materials development and process engineering enabling the fabrication of unconventional opto-electronic devices, such as displays, circuits, and solar modules, all on flexible foils using several new materials.¹⁻³ Examples of unconventional electronic materials include organic small molecular and polymeric semiconductors, metal chelates and complexes, and hybrid organic-inorganic metal oxides. Among the process development, I will discuss spin- and slot-dye coating, inkjet printing, and gravure printing. Finally, we report on charge transport characteristics of polymeric blends in various device architectures.

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(2) (a) Usta, H.; Yilmaz, M. D.; Avestro, A.-J.; Boudinet, D.; Denti, M.; Zhao, W.; Stoddart, J. F.; Facchetti, A. *Adv Mater* 2013, 25, 4327-4334. (b) Lu, S.; Drees, M.; Yao, Y.; Boudinet, D.; Yan, H.; Pan, H.; Wang, J.; Li, Y.; Usta, H.; Facchetti, A. *Macromolecules* 2013, 46, 3895-3906. (c) Hong, W.; Sun, B.; Guo, C.; Y., J.; Li, Y.; Lu, S.; Huang, C.; Facchetti, A. *Chem. Commun.* 2013, 49, 484-48

(3) (a) Guo, X.; Zhou, N.; Lou, S. J.; Smith, J.; Tice, D. B.; Hennek, J. W.; Ortiz, R. P.; López Navarrete, J. T.; Chen, L. X.; Chang, R. P. H.; Facchetti, A.; Marks T. J. *Nature Photonics* 2013, 7(10), 825-833. (b) Minder, N. A.; Lu, S.; Fratini, S.; Ciuchi, S.; Facchetti, A.; Morpurgo, A. F. *Adv. Mater.* 2013, 25, 4327-4334. (c) Fabiano, S.; Himmelberger, S.; Drees, M.; Chen, Z.; Altamimi, R. M.; Salleo, A.; Loi, M. A.; Facchetti, A. *Adv. En. Mater.* 2013, in press DOI:10.1002/aenm.201301409

Speaker Biosketch

Berkeley and at Northwestern University, where he is currently an Adjunct Professor of Chemistry. Dr. Facchetti has published more than 300 research articles, 7 book chapters, and holds about 60 patents. He received the 2009 Italian Chemical Society Research Prize, the team IDTechEx Printed Electronics Europe 2010 Award, and he is a 2010 Kavli Fellow, a 2012 American Association for the Advancement of Science (AAAS) Fellow, and a 2013 Materials Research Society (MRS) Fellow. He was selected among the "Top 100 Materials Scientists of the past decade (2000-2010)" by Thomson Reuters. Dr. Facchetti's research interests include organic semiconductors and dielectrics for thin-film transistors, conducting polymers, molecular electronics, organic second- and third order nonlinear optical materials, and organic photovoltaics.