center for excitonics

ORGANIC SEMICONDUCTOR CHEMISTRY

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***Abstract*:** Organic semiconductors have attracted interest for electronic applications due to their potential for use in low-cost, large-area, flexible electronic devices. While many examples of organic semiconductors for p-channel and n-channel organic field-effect transistors (OFETs) and organic photovoltaic systems (OPVs) have been reported in the recent literature, there is a paucity of high-performance, solution-processable, small-molecule electron transport materials. Here, we report that bis(NDI) derivatives with conjugated bridging groups based on fused heterocycle ring systems can be used to create solution-processed films that exhibit OFET electron mobility values of up to 1.5 $cm^2V^{-1}s^{-1}$, which is among the highest yet reported for an n-channel OFET based on a solution-processed small molecule. In addition we will discuss the development of metal complexes that can be used to both n-dope or p-dope organic semiconductors and the use of surface modifiers to vary the work function of electrodes for use in optoelectronic applications.

Bio Seth Marder is currently the Georgia Power Chair of Energy Efficiency and Professor of Chemistry and Materials Science and Engineering at Georgia Tech. He obtained a BS in Chemistry from MIT in 1978 and a PhD from the University of Wisconsin-Madison in 1985 where he was a W. R. Grace Fellow. He was a postdoctoral researcher at the University of Oxford from 1985–1987 and was a research associate at the Jet Propulsion Laboratory (JPL), Caltech from 1987–1989. Later, he joined the technical staff at the JPL and Beckman Institute at Caltech and served as Associate Director for the Office of Naval Research Center for Advanced Multi-Functional Nonlinear Optical Polymers and Molecular Assemblies until he moved to the University of Arizona in 1998. He is the Deputy Director and co-principal investigator on the NSF Science & Technology Center: Materials & Device for Information Technology Research. In 2003, he moved to the School of Chemistry and Biochemistry at the GT where he is founding Director for the Center for Organic Photonics and Electronics. He also has a courtesy appointment in the School of Material Sciences and Engineering. He is the co-Director of Georgia Tech's NSF-Materials Research Science and Engineering Center, (MRSEC), Director of the AFOSR-Center for Organic Materials for All-Optical Switching, and an Associate Director for a DOE, funded Energy Frontier Research Center.

His research interests are in the development of materials for nonlinear optics, applications of organic dyes for photonic, display, electronic and medical applications, and organometallic chemistry. Recently, his research group has been systematically designing dyes for large two-photon absorption cross sections for a variety of applications ranging from two-photon induced polymerization to dyes for two-photon fluorescence microscopy.

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