ERATO SEMINAR

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Organic semiconductors for flexible printed electronics

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Center for Organic Photonics and Electronics, Georgia Institute of Technology

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Meeting Room 2 (33B2), Engineering Bldg. 2, University of Tokyo

Advances during the last 30 years in the synthesis and processing of organic materials with nonlinear optical and semiconducting properties, have fueled the emergence of a new technology that can potentially lead to low cost, flexible, and large area plastic optoelectronic devices and systems. Recent research breakthroughs in light-emitting diodes for displays and lighting, solar cells for portable power, and thin-film transistors are bringing flexible electronic technologies closer to commercialization. However, despite these technological advances, many challenges still remain in understanding the fundamental physical properties of the organic semiconductors used as active layers and the contacts they form at interfaces with adjacent organic layers or other materials used as electrodes.

In this talk, we will discuss selected examples of recent advances made in developing new materials and device architectures that lead to organic light-emitting diodes, organic solar cells, and field-effect transistors with superior performance and stability. In particular, we will review several strategies that were employed to control the work function of electrodes and show how these approaches can be used to design organic solar cells with novel geometries. We will also present studies of the operational and environmental stability of flexible organic field-effect transistors that are comprised of a dual-layer gate dielectric. This architecture was found to yield to devices with unprecedented stability. Finally, we will discuss some of the challenges and future directions of this disruptive emerging technology platform.

About the Speaker: Bernard Kippelen is a professor at the School of Electrical and Computer Engineering at the Georgia Institute of Technology where his research ranges from the investigation of fundamental physical processes (nonlinear optical activity, charge transport, light harvesting and emission) in organic nanostructured thin films, to the design, fabrication and testing of light-weight flexible optoelectronic devices based on organic-based materials. He serves as Director of the Center for Organic Photonics and Electronics. He is a Fellow of OSA and SPIE, and the Founding Editor of *Energy Express,* an OSA publication.

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