CHEMICAL ENGINEERING

SEMINAR SERIES

ELSA REICHMANIS

Monday, January 4

Brook Byers Professor of Sustainability
Professor of Chemical & Biomolecular Engineering
Georgia Institute of Technology

Structure – Process – Property Relationships Governing Solution Processed Semiconductor Performance

ABSTRACT: Polymeric semiconductors are promising materials for the commercialization of large-area, low-cost and flexible electronics. Their electrical properties are extremely sensitive to structure at multiple length scales, and process modifications can impact calculated hole mobilities by up to four orders of magnitude. For the readily available semiconducting polymer, poly(3-hexylthiophene) (P3HT), various microstructural features that correlate well with hole mobility have been identified. These include paracrystalline disorder, exciton bandwidth, polymer molecular weight, orientation of crystalline domains, and inter-grain connectivity. Here, a set of general, robust analysis algorithms will be presented that can be used to statistically quantify two-dimensional order in microstructures of P3HT-based OFET devices. Application of these analytical techniques to a variety of shear-based processing methods indicate that shear-driven alignment of P3HT fibers can effect substantial improvements in macroscale mobility.

RECEPTION 3:30 • LECTURE 4:00 – 5:00
PHYSICS ASTRONOMY BLDG. (PAA) A110

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BIO: Elsa Reichmanis is Brook Byers Professor of Sustainability and Professor, Chemical and Biomolecular Engineering at the Georgia Institute of Technology. Prior to joining Georgia Tech she was Bell Labs Fellow and Director of the Materials Research Department at Bell Labs, Alcatel-Lucent. She received her Ph. D. and BS degrees in chemistry from Syracuse University. In 1984, she was promoted to Supervisor of the Radiation Sensitive Materials and Application Group, followed by promotion to Head of the Polymer and Organic Materials Research Department in 1994. Her research interests include the chemistry, properties and application of materials technologies for photonic and electronic applications, with particular focus on polymeric and nanostructured materials for advanced technologies. She has had impact in the design of new imaging chemistries for advanced lithographic applications, and designed one of the first, readily accessible and manufacturable polymers for advanced silicon device manufacturing using 193 nm lithography. In a separate but related area, she designed and developed a nanoporous material exhibiting a dielectric constant as low as 1.4. The Reichmanis research group is currently exploring polymeric and hybrid organic/inorganic materials chemistries for electronic and photonic applications, plastic electronics in particular. Elsa Reichmanis was elected to the National Academy of Engineering in 1995 and has participated in several National Research Council (NRC) activities. She has served as a member of the NSF Math and Physical Sciences Advisory Committee, co-chair of the NRC Board on Chemical Sciences and Technology, was a member of the Visiting Committee on Advanced Technology of the National Institute of Standards and Technology (NIST), and was an elected member of the Bureau of the International Union for Pure and Applied Chemistry (IUPAC). She has been active in the ACS throughout her career, having served as 2003 President. In other technical activities, she served as a member of the Air Force Scientific Advisory Board. Elsa Reichmanis is the recipient of several awards, including named university lectureships. Among those are the 1993 Society of Women Engineers Achievement Award and the 1996 ASM Engineering Materials Achievement Award. In 1995, she was named Bell Laboratories Fellow. She was awarded the ACS Award in Applied Polymer Science in 1999, and is the 2001 recipient of the Society of Chemical Industry's Perkin Medal. In other service, she is associate editor of the ACS Journal, *Chemistry of Materials*.