Georgia Tech

Materials Research Science and Engineering Center

Event: MRSEC Seminar Series

Speaker: Prof. John Reynolds

Title: IRG-2: Highly-Ordered Redox-Doped π-Conjugated Organic Materials with Tunable Electronic, Thermal, and Physical Properties

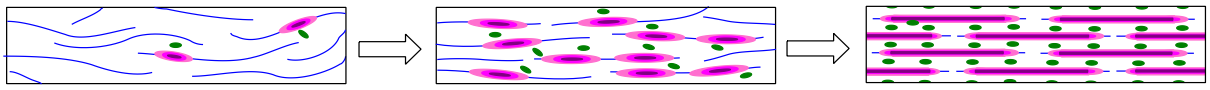
Affiliation: School of Chemistry & Biochemistry, Georgia Institute of Technology

Where: Marcus Technology Building, Room 1116

When: Tuesday, April 15, 2014 at 3:00 PM

ABSTRACT

Future electronic devices will be transparent, curved, flexible, stretchable, and interfaced with soft biological systems, thus, technologically relevant materials need to satisfy a combination of properties. IRG-2 will develop and study new classes of redox-doped π-conjugated organic molecules, oligomers, and polymers, in which the total interaction energy and packing between the matrix material and dopants are controlled by chemical structure and processing and tune the electronic coupling between neighboring matrix moieties. Supramolecular control of structure will allow for the design and demonstration of doped materials with strong intermolecular/interchain electronic couplings that can be strategically processed (e.g., via shear processing) into self-organized and highly ordered films with high (near-metallic) conductivity (see schematic below) in combination with other properties such as tunable work function, high thermal conductivity, mechanical flexibility, and biocompatibility.



Schematic of the proposed IRG-2 approach consisting of the design of highly ordered materials that self-organize due to the tunable order and carrier delocalization created by the intermolecular interactions between the molecular redox dopant ions (green spheres) and charged carriers (magenta) on the π-conjugated molecules, oligomers, and polymers (blue lines).

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