JOINT MRSEC & MATERIALS SEMINAR

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"Designing Macromolecules for Advanced Energy Conversion and Nanofiltration Applications"

Monday

May 4, 2015

3:30 p.m.

Seminar Hall

Designer polymers provide a platform by which to generate nanostructured, multifunctional materials with tailored chemical and optoelectronic functionalities whose solution-processable nature allows for the device fabrication procedures that are compatible with high-throughput (*e.g.*, roll-to-roll coating) manufacturing processes. As such, these macromolecules offer the promise of providing tailor-made, low-cost materials solutions to some of the most pressing materials science and engineering challenges of the day. Here, we will discuss two distinct classes of functional macromolecules with tailored chemistries for implementation into nanofiltration and energy conversion applications.

In the first of these efforts, we describe the synthesis, molecular characterization, and the solid-state electronic device application of an emerging class of transparent conducting macromolecules, radical polymers. Radical polymers are macromolecular materials that have flexible polymeric backbones and pendant groups that bear stable radical moieties. In contrast to almost all other semiconducting polymers, radical polymers lack backbone conjugation and are completely amorphous in the solid state. Despite this shift in macromolecular design archetype, we demonstrate that the solid-state electrical conductivity and charge carrier mobility values of a glassy model radical polymer are on par with the conductivity and mobility values of oft-used conjugated, semicrystalline polymer semiconductors [*e.g.*, poly(3-hexylthiophene) (P3HT)]. Furthermore . . . Please attend the lecture to hear the rest of his story!