



# MSE SEMINAR

Materials Science and Engineering  
Michigan Technological University

Friday, February 16, 2007

3:00 - 4:00 pm

Room 610, M&M Building

## Synthesis and Processing of High-Electroresponse Dielectric Electroactive Polymer NanoMaterials for Energy and Biomedical Applications

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The study of electric charge storage and dipole polarization phenomena in dielectric polymer materials, and electrostatic field effects caused by these charges, is attractive due to the results of the discovery and development of novel dielectric polymers as potential soft active materials. These materials have been used in energy and biomedicine industries for such applications as capacitors, energy sources, information storage, artificial muscles and skins, transducers, and BioMEMS. One challenge is to controllably tailor their structures and properties to significantly improve the electroactive response of these dielectric polymer materials. We have developed two classes of dielectric electroactive polymer nanomaterials with high and fast electric energy storage and electromechanical actuation by exploiting innovative approaches to polymer synthesis and processing. In this presentation, firstly I would present the results of nanoscale control of molecular dipole domains and related spontaneous polarization response in PVDF-based ferroelectric dipolar fluoropolymers by optimizing polymer synthesis and processing conditions. Nextly I would discuss nanoscale control of molecular charge domains and related superelectronic polarization response in CuPc oligomer-based polymer composites using the similar approaches. These results indicate the potential of nanostructures in developing high-performance dielectric and electroactive polymer smart materials for electric charge capturing, storage, actuation and sensing. Finally, I will briefly introduce my ongoing researches and future directions.

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