UC San Diego
JACOBS SCHOOL OF ENGINEERING
NanoEngineering

UC SAN DIEGO NANOENGINEERING SEMINAR

Wednesday, October 12, 2016
Seminar Presentation: 11:00am – 12:00pm
Cymer Conference Center

Nanostructured Electroactive Polymers for Advanced Energy and Electronics Technologies

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Abstract:

Nanostructured materials become critically important in many areas of technology, ranging from renewable energy, electronics, and photonics to biology and medicine, because of their unusual physical/chemical properties due to confined dimensions of such materials. This talk will present a new class of polymeric materials we developed recently: nanostructured conducting polymer gels (nCPGs) that offer an array of advantageous features such as intrinsic 3D nanostructured conducting framework, exceptional electrical conductivity and electrochemical activity to store and transport ions, synthetically tunable structures and chemical interfaces. These functional organic building blocks have been demonstrated powerful for a number of significant applications in energy, environmental and health-related technologies. Several examples on nCPGs-enabled advanced energy and smart electronic devices, will be discussed to illustrate 'structure-derived functions' of this special class of materials.

I will also share our recent progress on developing hybrid gels with delicately controlled structures to endow them with enhanced smart properties and designed new functionalities. For instance, hierarchically porous gels were designed as "host" matrix, and using molecules with multi-functional groups as the crosslinkers, other polymers with distinct functionalities were introduced as 'guest' to form hybrid gels. By tuning the interactions between two polymeric networks and chemically modifying the interface, the physical characteristics of hybrid gels could be rationally controlled. We have revealed the fundamental structure-property-function relationship of these new materials, and explored their interesting applications in self-healing, thermoresponsive electrolytes, controlled drug release, adaptive electronics.

Biosketch:

Dr. Guihua Yu is an Assistant Professor of Materials Science and Engineering at University of Texas at Austin. He received his B.S. degree with the highest honor in chemistry from University of Science and Technology of China, and earned his Ph.D. in chemistry from Harvard University, followed by postdoc training at Stanford University. His research has been focused on rational synthesis and self-assembly of functional organic nanostructures and two-dimensional nanostructured inorganic solids for energy, environmental and healthcare technologies. He has received several notable awards/honors for young scientists including recent Alfred P. Sloan Research Fellowship, *Royal Society of Chemistry* Emerging Investigator Lectureship, MIT Technology Review '35 Top Innovators Under 35', 3M Nontenured Faculty Award, US Frontiers of Engineering by NAE, Emerging Young Investigator named by both Royal Society of Chemistry (*J. Mater. Chem.*) and American Chemical Society (*Chem. Mater.*), Ralph E. Powe Jr. Faculty Award, IUPAC Prize for Young Chemists.