

Fall 2009 Seminar Program

Friday, October 16th
 WBSH, Room 6030 - 3:15 p.m.



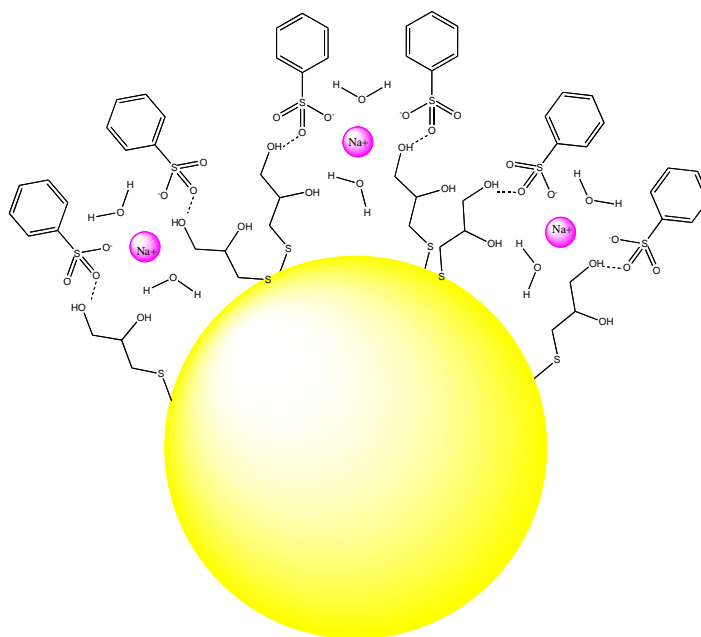
Matthew P. Espe, Ph.D.
 Associate Professor
 University of Akron



“Polymer-Nanoparticle Composites for Photovoltaics”

ABSTRACT

The properties of polymer-semiconducting nanoparticle (NP) composites-materials for hybrid , bulk-heterojunction photovoltaic materials-are highly dependent on the interactions at the interface of the NPs and polymer. Composite films of water-soluble polymers and CdS NPs have been produced both by synthesizing the NP within the polymer matrix and by adding the CdS NP, containing a capping agent, to the polymer. The composites have been characterized by optical techniques as well as ¹H, ¹³C and ¹¹³Cd solid-state NMR. When synthesizing the NP within the polymer, the polymer matrix plays a role in the cadmium sulfide NP nucleation, growth and structure, but does not inhibit surface oxidation, which is observed to occur in only the outermost layers. In the blended system, the glycerol capping agent and sulfonated polymer are observed to interact through hydrogen bonding. The structure of the interface, and its dependence on molar ratios will be discussed.



BIO

Espe received his B.S. and M.S. degrees from Illinois State University and Ph.D. in Biophysical Chemistry from Michigan State University. He was a post-doctoral at Washington University, St. Louis where he studied solid-state NMR characterization of macromolecular systems. He joined the faculty in the Department of Chemistry at The University of Akron in 1997 where he is currently an Associate Professor. The research focus of the Espe group is the characterizations of interfacial structures in macromolecular materials by solid-state NMR.