

## Design, Synthesis and Characterization of Stimuli Responsive Nanocomposites

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Both advances in nano- and micro-technologies and the desire for fine tuning of macromolecular properties have spurred efforts for material design and manipulation at the molecular scale. To effectively design a material for a particular application, we need an understanding of the fundamental relationships between molecular structure/architecture, intra- and inter-molecular interactions, secondary structures, and macromolecular (engineering) properties. The focus of this talk is the synthesis, characterization, and utilization of polymers—in bulk and grafted to surfaces and interfaces—such that macroscopic properties can be controlled by selection and method of integration of the molecular-level components. Well-controlled syntheses allow for targeted selection of chemical composition, molecular weight, and ultimately the stimulus condition and resultant change in properties. One polymer type discussed will be stimuli-responsive polymers (SRPs) which display substantially altered physical properties (e.g., shape, size, viscosity) in response to environmental triggers (e.g., temperature, pH, solvent quality). SRPs will be examined in bulk and as part of polymer-grafted nanoparticle composites that offer inherent advantages in terms of being able to fine-tune nanostructure, surface chemistry, integrate multiple (potentially disparate) materials, and dynamically assemble two- and three-dimensional structures. Characterization of stimuli responsive behaviors will be presented in the context of a wide range of applications including medicine, energy harvesting, sensors, self-healing materials, and environmental remediation.



Dr. Keisha B. Walters received her Ph.D. in Chemical Engineering from Clemson University in 2005. She was a faculty member in the Swalm School of Chemical Engineering at Mississippi State University for 11 years. Dr. Walters is currently a Professor of Chemical, Biological and Materials Engineering at the University of Oklahoma. She holds the Conoco-Dupont Professorship in Chemical Engineering at OU and is Director of the Polymer Science and Engineering Laboratory (PolySEL). Dr. Walters' research focuses on polymer- and nano-based materials engineering and transport modeling, and has been published in over 85 refereed technical manuscripts and presented at numerous national and international

conferences.

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