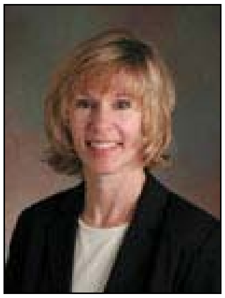
Integrating biological and chemical strategies for the production of multifunctional biopolymeric materials



Professor Kristi Kiick

Department of Materials Science
University of Delaware
Newark, DE

In order to develop materials that can elicit specific responses to chemical and biological stimuli, it has become increasingly important to understand critical design features that control the structure, function, and assembly of macromolecules. Such understanding may permit the design of novel and functional biomolecular structures that are capable of selectively and efficiently interacting with cellular and other targets and/or directing materials properties. In the Kiick group, genetically directed methods are being employed to produce artificial repetitive proteins capable of controlled presentation of saccharides, peptides, and/or electroactive groups. The well-defined protein polymers produced via these methods exhibit desired and controlled conformational behavior and are being used to study biological phenomena such as the role of glycopolymer architecture in mediating biological binding events, as well as materials phenomena such as the impact of polymer architecture on luminescence or the impact of protein surfaces on the growth of material substrates.

We are also exploring the use of biologically relevant protein-polysaccharide interactions as a mechanism for controlling network formation and degradation in drug delivery matrices. We have demonstrated that heparin-modified, poly(ethylene glycol) star copolymers can be used in the assembly of responsive bioactive hydrogel networks via multiple strategies. The release of growth factors from these heparinized hydrogels has also been demonstrated via immunochemical and cellular assays and is correlated with the erosion of the network. Significant opportunities exist for utilizing these architectures for understanding mechanisms of cellular interactions with materials surfaces and for developing networks with controlled properties useful for biomaterials applications.

DOW

Fall 2007 ChBE Seminars have been sponsored by Dow Chemical

Thursday, December 6 at 4:00 PM in Tech LR5
The Technological Institute
2145 Sheridan Road
Refreshments will be served at 3:45 PM