GEMSEC SEMINAR

GENETICALLY ENGINEERED MATERIALS SCIENCE AND ENGINEERING CENTER, AN NSF-MRSEC AT THE UW

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153 Mueller Hall
Materials Science and Engineering

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Biomolecular Chemistry
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Rational Design of Responsive Switches to Initiate Assembly of Well-Defined Supramolecular Structures

The coiled-coil motif, defined by two or more interwound-helices, design of synthetic peptide systems that self-assemble into inspired the structurally defined, supramolecular fibrils on the basis of features programmed into the peptide sequence. However, native biomacromolecular assemblies are characterized not only by well-defined structures but also by unique functions that arise as a consequence of those structures. One important function is the ability to sense and respond to incremental changes in environmental conditions. A critical challenge in the creation of synthetic biomolecular assemblies is the rational design of responsive mechanisms that can be coupled to supramolecular structure to recreate the self-assembly behavior that is characteristic of native biological systems. We report the design and characterization of peptides based on trimeric coiled-coil motif that reversibly self-assemble into long aspect-ratio-helical consequence of conformational transitions that are induced in response to changes in environment. A series of synthetic peptide materials are described in which artificial allosteric sites are introduced at structurally critical core positions in the peptide sequence such that self-assembly can be potentiated through incremental changes in environmental stimuli (pH, metal ion or small-molecule) within a sharply defined concentration range under physiologically relevant conditions.

This peptide engineering strategy represents a promising approach to design of intelligent materials that combine the formation of well-defined, supramolecular structures with environmentally responsive self-assembly.

**Prof. Conticello is a Professor in the Department of Chemistry at the Emory University in Atlanta, GA, USA. His research is focused on the synthesis, characterization, and applications of materials with controlled microstructures, particularly novel biomaterials.*