"Minimalistic peptide nanotechnology"

ORGANIC SEMINAR

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CUNY Nanoscience Initiative,

CUNY Advanced Science Research Center

Friday, October 6th,

9:00am

Hutchison Hall 473

University of Rochester

Department of Chemistry

Abstract

Peptide nanotechnology is based on the observation that the structures and machines of living systems are largely made from just 20 chemically simple components, the amino acids; they are clearly incredibly versatile building blocks. We investigate how much simpler combinations of amino acids (i.e. simple peptides) may be exploited, as structural and functional components for materials science and nanotechnology.

In order to achieve this, we are developing computational[1] and experimental[2] screening tools to explore and map the peptide sequence space for a variety of functions. In doing so we are establishing sequence-to-function rules in short peptides, relevant for assembly, emulsification[3], reactivity and catalysis, templating and molecular recognition. In addition to using peptides as building blocks for nanoscale materials, we are developing methodology to incorporate dynamic functionality by using catalysis to drive peptide self-assembly. We will show that this provides a powerful approach for the introduction of dynamic aspects in materials science and nanotechnology, giving access to dynamic properties were both kinetics of formation and properties and spatial locale of the structures formed may be regulated. We are investigating a number of applications of biocatalytic self-assembly, including controlling motility, controlling supramolecular order in electronic materials[4], and the use of self-assembly peptides to control the catalytic/oxidative formation of synthetic melanin-like materials[5], *etc.*

1.Frederix et al., *Nature Chemistry*, **2015**; 2. Pappas et al., *Nature Nanotechnology*, **2016**; 3. Scott et al., *Advanced Materials*, **2016**.; 4. Kumar et al., *Nature Chemistry* (in review, **2017**).; 5. Lampel et al., *Science*, **2017**.

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