

CENTER FOR RESEARCH IN SOFT MATTER & POLYMERS

CRISP SEMINAR

Co-Sponsored by:

- UD CHARM an NSF MRSEC - DMR-2011824
- NSF PIRE: Bio-inspired Materials and Systems OISE-1844463

FRIDAY, MAY 14, 2021

10 A.M. - 12 P.M.

ZOOM WEBINAR



“Bilingual Peptide Nucleic Acids: Encoding the Languages of Nucleic Acids and Proteins in a Single Self-Assembling Biopolymer”

Nature encodes information, structure, and function in two basic forms of biopolymers: nucleic acids and proteins. Although Nature has evolved machinery to read the nucleic acid code and translate it into amino acid code, the extant biopolymers are restricted to encoding amino acid or nucleotide sequences separately, limiting their potential applications in medicine and biotechnology. We demonstrate the design, synthesis, and stimuli-responsive assembly behavior of a bilingual biopolymer that integrates both amino acid and nucleobase sequences into a single peptide nucleic acid (PNA) scaffold to enable tunable storage and retrieval of tertiary structural behavior and programmable molecular recognition capabilities. Incorporation of a defined sequence of amino acid side-chains along the PNA backbone yields amphiphiles having a “protein code” that directs self-assembly into micellar architectures in aqueous conditions. However, these amphiphiles also carry a “nucleotide code” such that subsequent introduction of a complementary RNA strand induces a sequence-specific disruption of assemblies through hybridization. Together, these properties establish bilingual PNA as a powerful biopolymer that combines two information systems to harness structural responsiveness and sequence recognition.

“Self-Care Is Not the Enemy of Performance”

The highly competitive nature of academic environments might seem to suggest that success can only be obtained at the cost of taking good care of oneself. However, sacrificing self-care can be extremely harmful. This seminar will discuss ways that high performance and self-care can be mutually reinforcing and produce long-term success. A key goal is for each person to take away a set of practical strategies and habits they can employ to support their mental and physical health while also supporting their future success in research.

PROF. JENNIFER M. HEEMSTRA

Professor

Department of Chemistry

EMORY UNIVERSITY

Prof. Heemstra received her B.S. in Chemistry from the University of California, Irvine, in 2000. At Irvine, she performed undergraduate research with Prof. James Nowick investigating the folding of synthetic beta-sheet mimics, which instilled in her a love of supramolecular chemistry. She then moved to the University of Illinois, Urbana-Champaign, where she completed her Ph.D. with Prof. Jeffrey Moore in 2005 studying the reactivity of pyridine-functionalized phenylene ethynylene cavitands. After a brief stint in industry as a medicinal chemist, she moved to Harvard University to pursue postdoctoral research with Prof. David Liu exploring mechanisms for templated nucleic acid synthesis. In 2010, Prof. Heemstra began her independent career in the Department of Chemistry at the University of Utah and was promoted to Associate Professor with tenure in 2016. In 2017, Prof. Heemstra and her research group moved to the Department of Chemistry at Emory University. Research in the Heemstra lab is focused on harnessing the molecular recognition and self-assembly properties of nucleic acids for applications in biosensing and bioimaging. Outside of work, she enjoys spending time with her husband and two sons, as well as rock climbing, cycling, and running.

REGISTER NOW

<https://sites.udel.edu/udcrisp>

