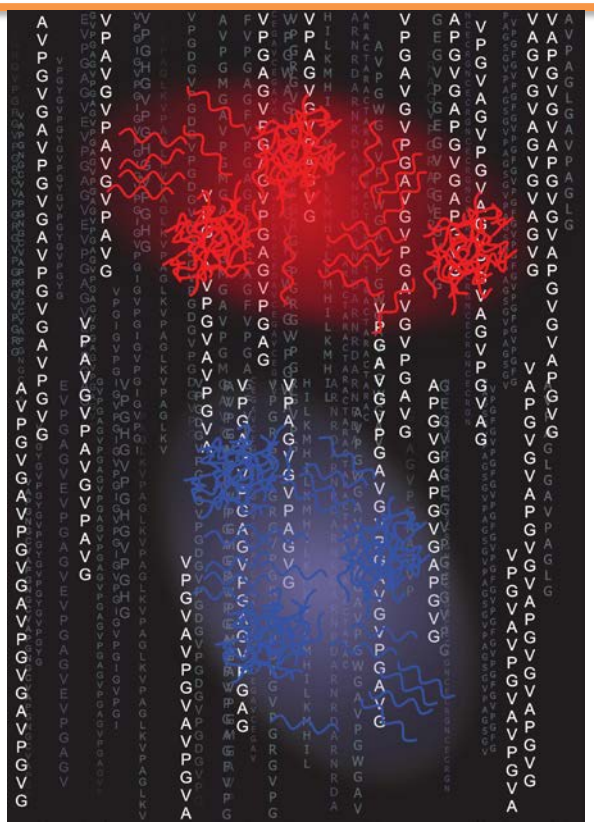
Prediction and Design of Protein Polymer Phase Behavior at the Sequence Level

Newly discovered genetic sequences will allow unprecedented control over assembly of protein structures



Scientists at Duke University have deciphered the genetic code that instructs proteins to either self-assemble or disassemble in response to environmental stimuli, such as changes in temperature, salinity, or acidity.

In their recent publication in *Nature Materials,* Research Triangle MRSEC professor **Ashutosh Chilkoti** and graduate fellow **Felipe Garcia Quiroz** created test motifs to identify the amino acid sequences that determine phase behavior in proteins. They demonstrate that proteins can be designed to exhibit tunable phase transitions, allowing significant control over assembly and disassembly processes.

These very simple guiding principles, or "sequence heuristics" set the foundation for designing and encoding phase behavior at the sequence level as well as identifying existing proteins that exhibit desirable phase behavior. These heuristics and the accompanying library of the protein polymers described by Quiroz and Chilkoti represent exciting new tools to study phase behavior in biology or to exploit phase transitions for applications in fields as diverse as materials science, biotechnology and medicine.

"Sequence Heuristics To Encode Phase Behaviour In Intrinsically Disordered Protein Polymers," Felipe García Quiroz and Ashutosh Chilkoti. Nature Materials, Sept. 21, 2015. DOI: 10.1038/NMAT4418