

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Kinetically controlled transition from disordered aggregates to ordered lattices of a computationally designed peptide sequence.¹ YU TIAN, Univ of Delaware, HUIXI ZHANG, University of Pennsylvania, KRISTI KICK, Univ of Delaware, JEFFREY SAVEN, University of Pennsylvania, DARRIN POCHAN, Univ of Delaware — Peptides with well-defined secondary-structures have the ability to exhibit specific, local shapes, which enables the design of complex nanostructures through intermolecular assembly. Our computationally designed coiled-coil homotetrameric peptide building block can self-assemble into 2-D nanomaterial lattices with predetermined symmetries by control of the coiled-coil bundle exterior amino acid residues. And the assemblies can be controlled kinetically. Firstly, the solution pH influences the assembly by affecting the external charged state of peptide bundles which can lead the bundles to be either repulsive or attractive to each other. At room temperature when peptides are under the least charged pH conditions, disordered aggregates are formed that slowly transformed into the desired 2-D lattice structures over long periods of time (weeks). Around neutral pH, even subtle charge differences that come from small pH changes can have an influence on the thickness of afterwards formed plates. Secondly, the solution temperature can largely eliminate the formation of disordered aggregates and accelerate the assembling of matured, desired nanomaterial plates by providing extra energy for the organization process of assembly building blocks. The ability to control the assembly process kinetically makes our peptide plate assemblies very promising templates for further applications to develop inorganic-organic hybrid materials.

¹Funding acknowledged from NSF DMREF program under awards DMR-1234161 and DMR-1235084

Yu Tian
Univ of Delaware

Date submitted: 10 Nov 2016

Electronic form version 1.4