Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Nucleic Acid-Peptide Complex Phase Controlled by DNA Hybridization JEFFREY VIEREGG, MICHAEL LUECKHEIDE, LORRAINE LEON, AMANDA MARCIEL, MATTHEW TIRRELL, University of Chicago — When polyanions and polycations are mixed, counterion release drives formation of polymer-rich complexes that can either be solid (precipitates) or liquid (coacervates) depending on the properties of the polyelectrolytes. These complexes are important in many fields, from encapsulation of industrial polymers to membrane-free segregation of biomolecules such as nucleic acids and proteins. Condensation of long double-stranded DNA has been studied for several decades, but comparatively little attention has been paid to the polyelectrolyte behavior of oligonucleotides. We report here studies of DNA oligonucleotides (10 - 88 nt) complexed with polylysine (10 - 100 aa). Unexpectedly, we find that the phase of the resulting complexes is controlled by the hybridization state of the nucleic acid, with double-stranded DNA forming precipitates and single-stranded DNA forming coacervates. Stability increases with polyelectrolyte length and decreases with solution salt concentration, with complexes of the longer double-stranded polymers undergoing precipitate/coacervate/soluble transitions as ionic strength is increased. Mixing coacervates formed by complementary single-stranded oligonucleotides results in precipitate formation, raising the possibility of stimulus-responsive material design.

Jeffrey Vieregg
Univ of Chicago

Date submitted: 06 Nov 2015

Electronic form version 1.4