Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Effect of Supercharging on Coacervation Between Proteins and Polyelectrolytes BRADLEY OLSEN, ALLIE OBERMEYER, CAROLYN MILLS, XUEHUI DONG, MIT — Complex coacervates have attracted a great deal of attention as a method to encapsulate biological molecules including DNA and proteins. However, a large fraction of proteins will not form coacervates with oppositely charged polymers unless their surface charge density is increased through a process known as supercharging. Using mass spectrometry, we are able to quantify the formal charge distribution of proteins after supercharging, and with this knowledge of the chemical state of the protein measure coacervate formation for a panel of proteins as a function of charge. While many of the proteins studied do not form coacervates or coacervate over only a narrow range of composition in their native form, all proteins form coacervates above a critical charge level with increasing range of coacervation as surface charge density increases. The resulting data is consistent with a strong induced charging effect in the coacervate state, as the largest coacervate forms near a charge ratio corresponding to proteins at their maximum charge. These observations in bulk coacervation are translated to the design of coacervate core micelles, providing an increased quantitative understanding of structure formation in these systems.

Bradley Olsen
MIT

Date submitted: 11 Nov 2014 Electronic form version 1.4