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Effect of Protein Supercharging on Interaction with Polyelectrolytes BRADLEY OLSEN, ALLIE OBERMEYER, CAROLYN MILLS, XUEHUI DONG, MIT — Complexation of proteins with polyelectrolytes can lead to a liquid-liquid phase separation to generate a viscous complex coacervate phase rich in protein and polyelectrolyte. However, many proteins do not readily coacervate at conditions near neutral pH and physiological ionic strength. Here, protein supercharging is used to systematically explore the effect of protein charge on the complex coacervation with polycations. Four model proteins were chemically modified to generate a panel of proteins with varying surface charge, with both the average charge and charge distribution quantified by mass spectrometry. Proteins phase separated with the qP4VP and qPDMAEMA polycations when the ratio of negatively charged residues to positively charged residues was greater than 1.1-1.2. Efficient partitioning of the protein into the coacervate phase required larger charge ratio (1.5-2.0). The model proteins were also encapsulated in complex coacervate core micelles. Dynamic light scattering was used to assess the formation of micelles with POEGMA-*b*-qP4VP and revealed micellar hydrodynamic radii of approximately 25-30 nm. Small angle neutron scattering and transmission electron microscopy were used to confirm the formation of spherical micelles.

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