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Understanding and Controlling Transitions in Polyelectrolyte Complex Materials SARAH PERRY, LI-WEI CHANG, YALIN LIU, BRIAN MOMANI, JON VELEZ, H. HENNING WINTER, University of Massachusetts Amherst — Polyelectrolyte complexation can be used in the self-assembly of a wide range of responsive soft materials ranging from dehydrated thin film and bulk solids to dense, polymer-rich liquid complex coacervates, and more complex hierarchical structures such as micelles and hydrogels. This responsivity can include swelling and dissolution, or liquid-to-solid transitions, typically as a function of ionic strength and/or pH. The patterning or presentation of charges and other chemical functionalities represents a powerful strategy for the design and manipulation of this type of responsiveness and the corresponding material properties. We utilize polypeptides and polypeptide derivatives as a model platform for the study of sequence and patterning effects on materials self-assembly. We also utilize rheology to understand the nature of the solid-to-liquid transition that has been observed in some systems. The goal of this systematic investigation of the effects of charge patterning is to elucidate design rules that facilitate the tailored creation of materials based on polyelectrolyte complexation with defined properties for a wide range of applications.

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