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### **Charge Effects on the Self-Assembly of Protein Block Copolymer Nanostructures**

BRADLEY OLSEN, MIT

Self-assembly of globular protein-polymer block copolymers into nanostructured phases provides a simple method for structural control in biomaterials. Electrostatics play a major role in the self-assembly of these structures from aqueous solutions. While the specific distribution of charge on the protein plays a relatively minor role in self-assembly, large changes in the total charge have a large impact on the concentration at which the proteins self-assemble. While for near-neutral proteins salt screening promotes disassembly and suggests that electrostatic interactions are attractive, proteins with a highly asymmetric charge have repulsive interactions that suppress self-assembly. Using a zwitterionic block in the bioconjugate was also explored as a means to promote self-assembly; however, zwitterionic fusions self-assemble over a narrower range of composition than fusions of any of the nonionic polymers explored. This suggests that dipolar attractions in charge-asymmetric protein-polymer materials play a significant role in the driving force for self-assembly. However, the sensitivity of zwitterionic materials to salt conditions in the buffer also provides a powerful handle for tuning polymer solubility, enabling salt to be used as a method to induce self-assembly.