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Structure and flow properties of block copolyelectrolyte hydrogels SAMANVAYA SRIVASTAVA, MATTHEW TIRRELL, Univ of Chicago — Polyelectrolyte complexes (PEC) are dense, polymer-rich phases that form when oppositely charged polyelectrolyte chains spontaneously associate and phase separate in aqueous mediums. Bulk phase separation of the PECs can be evaded by combining one or both of the polyelectrolytes with a neutral polymer, thus engineering pathways for self-assembly of PEC based micelles and hydrogels with large-scale ordering of the nanoscale PEC domains. The PEC domains in these assemblies can encapsulate both hydrophobic and hydrophilic therapeutics and thus have tremendous potential in drug delivery, diagnostic and tissue engineering applications. This study will present insights on the equilibrium structure and self-assembly kinetics of PEC hybrid hydrogels through detailed rheology studies of self-assembled materials comprising of functionalized polyallyl glycidyl ethers (PAGE) connected to either single poly(ethylene glycol) (PEG) chain to form diblock copolymers or as functionalized end-groups on a triblock copolymer with a PEG midblock. The effect of key parameters such as polymer concentration, polymer block lengths, salt, ionic strength, and degree of charge mismatch on the equilibrium materials properties will be discussed, with a special emphasis on the temporal evolution of flow properties, and will lead to comparisons with the rheology models for associating polymers. Complementary studies with extensive static and dynamic light, X-ray and neutron scattering investigations will also be presented, thus providing a comprehensive structural description of these materials.

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