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Determining the structure and properties of complex coacervate crosslinked triblock copolymer hydrogels DANIEL KROGSTAD, SOO-HYUNG CHOI, JASON SPRUELL, NATHANIEL LYND, EDWARD KRAMER, Materials Research Laboratory, University of California at Santa Barbara, MATTHEW TIRRELL, Institute for Molecular Engineering, University of Chicago
— The mechanical properties and structures of functionalized P(AGE-b-EO-b-AGE) hydrogels utilizing complex coacervation as a physical crosslink have been studied. The effects of variables such as polymer concentration, salt concentration, pH, stoichiometric ratios and temperature have been investigated by rheology and SAXS. It was found that the organization of the cores has a very strong effect on the mechanical properties. This can be observed as the storage modulus increases significantly between 15 and 16 wt% corresponding to a transition from a disordered gel to a BCC structure. Another dramatic change is observed when the storage modulus drops between 25 and 30 wt% as the hexagonal structure becomes predominant. Just as polymer concentration causes changes in structure and thus the properties, salt concentration has a similar effect due to the electrostatic nature of the hydrogels. As salt is added, the electrostatic interactions in the cores are screened until they are weak enough that the polymers are dissolved into the matrix. The mechanical properties and the physical nature of the crosslinks lead to the possibility of these gels being used as an injectable drug delivery system.

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