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Phase Segregation and Dynamics in Strongly Interacting Small Molecule Additive - Block Copolymer Surfactant Complexes ROHIT KOTHARI, Polymer Science and Engineering, University of Massachusetts Amherst (UMASS Amherst), AHMED KHALIL, H. HENNING WINTER, Chemical Engineering, UMASS Amherst, JAMES J. WATKINS, Polymer Science and Engineering, UMASS Amherst — Rheology and Small Angle X-Ray Scattering (SAXS) were used to investigate order to disorder transitions (ODTs) and disorder to order transitions (DOTs) of poly(ethyleneoxideb-propyleneoxide-b-ethyleneoxide) block copolymer surfactants mixed with hydrogen-bond-donating small molecule additives. A series of additives having a core benzene ring and systematic variation in the number of carboxylic or hydroxyl groups attached to the ring were of particular interest. Ordered cylindrical morphologies, confirmed using SAXS, were obtained only in a certain additive concentration region. ODTs were characterized by sudden changes in the linear viscoelastic properties in low frequency region upon increasing temperature. The locations of ODTs varied widely with hydrogen-bond-donating ability of the functional group and were found to be strongly dependent on the number of functional groups attached to the ring. For a given additive, the temperature at which ODT occur was strong function of the additive loading, whereas the linear viscoelastic properties of the ordered state were little changed upon varying additive concentration in ordered region. The location and dynamics of DOTs upon cooling were comparable to the ODTs upon heating. Studies using these model systems provide insight into the design of well-ordered hybrid materials. Polymer Science and Engineering, into the design of well-ordered hybrid materials. University of Massachusetts Amherst, Amherst, MA 01003

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