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The effects of monomer sequence distribution and isotopic substitution on solution phase behavior of random copolymers JAN GENZER, YOUNG KUK JHON, NC State University, RAMANAN KRISHNAMOORTI, University of Houston — We report on the effect of chemical composition, co-monomer distribution and $^1\text{H}/^2\text{D}$ isotopic substitution on the phase behavior in random copolymers of poly(styrene-co-4-bromostyrene) (PBr_xS), where x denotes the mole fraction of 4-bromostyrene (4-BrS), in cyclohexane. By adjusting the solvent quality during bromination of parent polystyrene, either random or random blocky PBr_xS , ($\text{r-PBr}_x\text{S}$ or $\text{b-PBr}_x\text{S}$, respectively), were synthesized. We study the temperature dependence of phase behavior of PBr_xS with various x in cyclohexane as a function of the polymer concentration using cloud point measurements and small-angle neutron scattering. Our results reveal that for a given 4-BrS content, the cloud points of $\text{b-PBr}_x\text{S}$ solutions are consistently higher and broader than those observed in $\text{r-PBr}_x\text{S}$ solutions. The transition temperature has also been found to depend on the isotope substitution of ^1H or ^2D in either the polymer or the solvent. Small angle neutron scattering measurements indicate significant differences in the temperature dependence of the thermodynamic behavior for the random and blocky samples and the nature of the fluctuations upon approaching the phase boundaries.

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