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**The effects of monomer sequence distribution and isotopic substitution on solution phase behavior of random copolymers** YOUNG KUK JHON, NCSU, RAMANAN KRISHNAMOORTI, U. of Houston, JAN GENZER, NCSU — We report on the effect of chemical composition, co-monomer distribution and H/D isotopic substitution on the phase behavior in copolymers of poly(styrene-co-4-bromostyrene) ( $\text{PBr}_x\text{S}$ ), 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  $\text{PBr}_x\text{S}$ , (r- $\text{PBr}_x\text{S}$  or b- $\text{PBr}_x\text{S}$ , respectively), were synthesized. We studied the temperature dependence of phase behavior of  $\text{PBr}_x\text{S}$  with various  $x$  in cyclohexane as a function of the polymer concentration using light scattering. Our results reveal that for a given 4-BrS content, the cloud points of b- $\text{PBr}_x\text{S}$  solutions are consistently higher and broader than those observed in r- $\text{PBr}_x\text{S}$  solutions. The transition temperature has also been found to depend on the isotope substitutions of H or D 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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