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Phase behavior of poly(pentafluorostyrene-b-methyl methacrylate) block copolymers TRACY BUCHOLZ, YUEH-LIN LOO, University of Texas at Austin — Fluorine-containing polymers have garnered interest for properties such as chemical inertness, high thermal stability, and low dielectric constants. Previously, the controlled synthesis of fluoropolymers has been difficult due to the electron-withdrawing nature of fluorinated monomers. This issue, however, has been addressed with the development of atom transfer radical polymerization. Using this technique, we have been able to synthesize diblock copolymers containing polypentafluorostyrene (PPfS) and poly(methyl methacrylate), PMMA. The resulting diblock copolymers exhibit narrow molecular weight distributions ($\leq$1.1) and undergo microphase separation to form highly-ordered nanostructures at moderate molecular weights. Comparisons of order-disorder transition temperatures with anionically synthesized poly(styrene-b-isoprene), PS/PI, diblocks of comparable molecular weights and compositions suggest that the segregation strength of PPfS/PMMA is within a factor of two of that of PS/PI. This observation is surprising given the chemical uniqueness of PPfS and PMMA but is in fact in agreement with the theoretical segregation strength relative to PS/PI predicted by differences in their solubility parameters.

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