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Stability of Fddd structure in diblock copolymer MYUNG IM KIM, SATOSHI AKASAKA, TSUTOMU WAKADA, MIKIHITO TAKENAKA, HIROKAZU HASEGAWA, Department of Polymer Chemistry, Graduate School of Engineering, Kyoto University — Recently we reported a new bicontinuous microdomain morphology with the symmetry of Fddd space group found in a polystyrene-*block*-polyisoprene (PS-PI) diblock copolymer with M_n = 2.64 x 10^4g/mol and f_{PI}= 0.638 (*Macromolecules* 2007, 40, 4399). The SAXS profile observed for this polymer coincided with that of the Fddd structure reported for PI-PS-PEO triblock terpolymers (*Macromolecules* 2002, 35, 7007). To examine the reproducibility and stability of the Fddd structure in PS-PI diblock copolymers, we synthesized four different PS-PI diblock copolymers (S1-S4) with slightly different compositions and molecular weights from that previously reported. We investigated the microdomain structures of S1-S4 as a function of temperature in situ by SAXS and for the quenched samples by TEM. All four samples exhibited the Fddd structure in different temperature ranges and order-order transitions (lamella-Fddd-gyroid or Fddd-gyroid) as well. Although the temperature ranges of the Fddd structure are narrow, prolonged annealing in the temperature range did not alter the morphology suggesting the thermal stability of the Fddd structure. Thus, we could confirm the reproducibility of the Fddd structure, which is stable in the temperature range between lamellar and gyroid morphologies.

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