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Orthorhombic *Fddd* Network in Diblock Copolymer Melts[1] MIKIHITO TAKENAKA, MYUNG IM KIM, SATOSHI AKASAKA, TSUTOMU WAKADA, SHOTARO NISHITSUJI, HIROKAZU HASEGAWA, Kyoto University
— Poly(styrene-*block*-polyisoprene) (S-I) diblock copolymer melts with asymmetric volume fraction are shown to form an orthorhombic *Fddd* network structure, which Tyler et al. predicted with self-consistent field theory for diblock copolymer melts. The studies with small-angle X-ray scattering and transmission electron microscopy revealed that the phase diagram of the S-I diblock copolymer exhibits the sequence of transition of disorder-gyroid- *Fddd*-lamellae with decreasing temperature and *Fddd* phase appears within the narrow composition and temperature range where gyroid, lamellae, and hexagonally perforated layer (HPL) phases appear. The ratio of unit cell parameters (a:b:c) estimated from the peak positions of the scattering function is 1:2.00:3.51, which agrees with the result of the theoretical calculation by Tyler et al. In this orthorhombic structure with the observed unit cell parameters, the higher order reflections 022, and 004 overlaps with the reflection 111 at the first order peak.

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