

## Small-angle X-ray Scattering Analysis of Anisotropic Block Copolymer Microdomains

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We present small-angle x-ray scattering (SAXS) analysis of anisotropic block copolymer materials of polystyrene-*block*-polyisoprene-*block*-polystyrene (SIS) as a fundamental statistical mechanical problem for open nonequilibrium systems. In order to develop the anisotropy we applied a large amplitude oscillatory shear strain to the system. We analyzed, at *real-time* and *in-situ*, time-evolution of the anisotropic spatial arrangement of microdomains by using time (strain-phase) resolved SAXS. We shall first discuss the shear-induced orientation of bcc-spheres such as described below, at temperatures well above OOT temperature where bcc-spheres are thermodynamically stable: twined bcc-spheres with the twinning plane parallel to the shear plane, and with their  $\langle 111 \rangle$  axes parallel to the shear direction. We shall then discuss shear-induced OOT from the oriented bcc-spheres described above to the oriented hex-cylinders, such as described below at a temperature slightly above OOT temperature where bcc-spheres are still stable thermodynamically in quiescent state: the cylinders orienting with its axis parallel to the shear direction and its  $\{110\}$  plane parallel to the shear plane.

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