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Shear induced order in SEP diblock copolymer micelles: multiple BCC slip systems MARIA A. TORIJA, SOOHYUNG CHOI, FRANK S. BATES, TIMOTHY P. LODGE, University of Minnesota — Poly(styrene-*b*-ethylene-*alt*-propylene) (SEP) diblock copolymers are solvated by squalane leading to glassy poly(styrene) domains dispersed in a viscoelastic medium. For diblocks containing less than about 50% by weight poly(styrene) and at SEP concentrations greater than 6 w. % these mixtures self-assemble into glassy spherical microdomains that order on a body centered cubic (BCC) lattice. We have investigated how polycrystalline configurations respond to large amplitude oscillatory shear as a function of shear rate, strain amplitude and block copolymer composition. Structure was characterized by small-angle X-ray scattering measurements while simultaneously deforming the mixtures with an *in-situ* rheometer. All three slip systems associated with plastic deformation in BCC metals$\{110\} < \bar{1}11 >, \{211\} < \bar{1}11 >, \{321\} < \bar{1}11 >$, were identified with the x-ray beam oriented perpendicular to the shear plane. Higher shear rates and larger strain amplitudes produced more slip within the $\{211\} < \bar{1}11 >$ system. These results represent one of the most comprehensive assessments of BCC structure in solvated copolymers and will be discussed within the context of the associated linear viscoelastic behavior.

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