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Self-Assembly of Narrowly Dispersed Brush Diblock Copolymers with Domain Spacing more than 100 nm[1] WEIYIN GU, University of Massachusetts Amherst, BENJAMIN SVEINBJORNSSON, California Institute of Technology, SUNG WOO HONG, University of Massachusetts Amherst, ROBERT GRUBBS, California Institute of Technology, THOMAS RUSSELL, University of Massachusetts Amherst — Self-assembled structures of high molecular weight (MW), narrow molecular weight distribution brush block copolymers containing polylactic acid (PLA) and polystyrene (PS) side chains with similar MWs were studied in both the melt and thin films. The polynorbornene-backbone-based brush diblock copolymers containing approximately equal volume fractions of each block self-assembled into highly ordered lamellae with domain spacing over 100 nm, as revealed by SAXS, GISAXS and AFM. The domain size increased approximately linearly with backbone length, which indicated an extended conformation of the backbone in the ordered state. The length of side chains also played a significant role in terms of controlling the domain size. As the degree of polymerization (DP) increased, the symmetric brush diblock copolymers with longer side chains tended to form larger lamellar microdomains in comparison to those that have the same DP but shorter side chains.

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