Abstract Submitted
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Self-assembly of crystalline bioinspired block copolymers A.M. ROSALES, H.K. MURNEN, Dept. of Chemical Engineering, University of California - Berkeley, R.N. ZUCKERMANN, Molecular Foundry, Lawrence Berkeley National Laboratory, R.A. SEGALMAN, Dept. of Chemical Engineering, University of California - Berkeley — Polypeptoids are sequence-specific biologically inspired polymers based on N-substituted glycines for which monodisperse, polymeric molecular weights can be achieved. Sequence control allows for a degree of tunability in both the self-assembly and thermal properties not available in classical polymer systems. We demonstrate that a series of homopolypeptoids are thermally stable to 300C and are crystalline with melting transitions ranging from 150C to 250C. The introduction of defects at precise locations in the polymer sequence (as a side chain substitution) allows crystallization and hence the melting temperature to be suppressed. Symmetric block copolymers with two crystalline polypeptoid blocks exhibit co-crystallization of the two blocks but distinct melting behaviors, indicating a disordered melt. If samples are carefully prepared to allow for microphase separation, block copolymer lamellae with long range order are formed with an order-disorder transition temperature well below the melting transition temperature of the polymer.

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