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Crystallization in sequence-defined peptoid diblock copolymers induced by microphase separation JING SUN, Lawrence Berkeley National Laboratory, NITASH BALSARA, University of California, Berkeley,, RONALD ZUCKERMANN, Lawrence Berkeley National Laboratory — Atomic level synthetic control over a polymer's chemical structure is desired for tuning the microphase separation and other properties of crystalline block copolymers. In order to explore the impact of side chain structure on crystallization behavior, we designed a series of chemically-defined, highly monodisperse peptoid diblock copolymers poly-N-2-(2-(2-methoxyethoxy)ethoxy)ethylglycine-block-poly-N-decylglycine (pNte-b-pNdc) with volume fraction of pNte (ϕ_{Nte}) values ranging from 0.28 to 0.71 and a polydispersity indices ≤ 1.0003 . Both monomers have nearly identical molecular volumes but the pNte block is amorphous while the pNdc block is crystalline. We demonstrate that all the block copolypeptoids self-assemble into lamellar microphases driven by crystallization of the pNdc block. To our knowledge, there are no previous reports of crystallization of a polymer chain induced by microphase separation. These investigations show that polypeptoids provide a unique platform for examining the intertwined roles of side chain organization on the thermodynamic properties of diblock copolymers.

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