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Self-Assembly and Chain-Folding in Hybrid Coil-Coil-Cube Triblock Oligomers of Polyethylene-b-Poly(ethylene oxide)-b-Polyhedral Oligomeric Silsesquioxane[1] LEI ZHU, JIANJUN MIAO, LI CUI, Institute of Material Science and Department of Chemical, Materials and Bimolecular Engineering, University of Connecticut, Storrs, CT 06269-3136 — Self-assembly and chain-folding in well-defined oligomeric polyethylene-block-poly(ethylene oxide)-block-polyhedral oligomeric silsesquioxane (PE-b-PEO-b-POSS) triblock molecules were studied. The triblock oligomers were synthesized by attaching two kinds of functional POSS molecules to a hydroxyl-terminated PE-b-PEO diblock oligomer. In the crystalline state, PE chains tilted 32 degrees from the lamellar normal, and both Ib-POSS and Cp-POSS molecules stacked into four-layer (ABCA) lamellar crystals, having the same trigonal symmetry as in pure POSS crystals. Because the cross-sectional area for a PE chain in the PE crystals (0.216 nm2/chain) at the interface was much smaller than that for a POSS molecule in POSS crystals (1.136 nm2/molecule), the self-assembly and PE chain-folding were substantially affected by the sequence of PE and POSS crystallization when crystallizing from the melt. This study indicated that confinement effect plays an important role on chain-folding of crystalline block oligomers.

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