Self-Organization and Chain-Folding in Hybrid Coil-Coil-Cube Triblock Oligomers of Polyethylene-\(b\)-Poly(ethylene oxide)-\(b\)-Polyhedral Oligomeric Silsesquioxane (POSS)\(^1\) JIANJUN MIAO, LI CUI, LEI ZHU, Institute of Material Science and Department of Chemical, Materials and Bimolecular Engineering, University of Connecticut, Storrs, CT 06269-3136 — In this work, the crystallization and self-assembly behaviors of well-defined triblock oligomers polyethylene-\(b\)-poly(ethylene oxide)-\(b\)-polyhedral oligomeric silsesquioxane (POSS) (PE-\(b\)-PEO-\(b\)-POSS) were studied. The samples were characterized by differential scanning calorimetry, synchrotron small angle X-ray scattering (SAXS), and wide angle X-ray diffraction (WAXD). The orientations of PE and POSS crystals in a shear-oriented sample were determined by 2D WAXD and SAXS. The results also suggest that POSS molecules form an ABCA-stacked four-layer lamellar (trigonal) crystal sandwiched by two PE-PEO layers. The solution-cast sample shows a long period of 13.37 nm, corresponding to an extended chain conformation in the PE crystals. When grown from the melt, the \(d\)-spacing decreases to 10.13 nm, indicative of once-folded chain conformation for the PE block.

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