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Can short alkyl chain fold in lamellar crystals?[1] JIANJUN MIAO, LI CUI, LEI ZHU, Polymer Program, Institute of Materials Science and Department of Chemical Engineering, The University of Connecticut, IGORS SICS, BENJAMIN HSIAO, Chemistry Department, State University of New York at Stony Brook — By coupling a hydroxyl-terminated polyethylene-*block*- poly(ethylene oxide) (PE-*b*-PEO or EEO) diblock oligomer and isocyanatopropyldimethylsilylcyclopentyl-polyhedral oligomeric silsesquioxane (CP-POSS), an asymmetric ABC coil-coil-sphere triblock oligomer was successfully synthesized. The structure and morphology of the supramolecular self-assembly in bulk EEO-POSS was studied by differential scanning calorimetry (DSC), synchrotron small- and wide-angle X- ray scatterings (SAXS and WAXD) and transmission electron microscopy. The melting temperature of the POSS in triblock copolymer was at ca.156 $^\circ$C as determined by DSC. The POSS crystallized into ABCA four-layer trigonal structure and sandwiched between the amorphous EEO layers. Below 100 $^\circ$C the PE block crystallized into two types of crystals, namely, extended and once-folded chain crystals with overall d-spacing of 14.0nm and 10.9nm, respectively. During a cooling process, the once folded-chain grew first and then extended chain grew at higher supercoolings. In a heating process, extended chain first melted and once folded chain disappeared at higher temperature.

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