

Abstract Submitted  
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**Hierarchical Superstructures from the Self-assembly of Giant Surfactants in Condensed State**<sup>1</sup> WEN-BIN ZHANG, XINFEI YU, XUEHUI DONG, YIWEN LI, KAN YUE, JINLIN HE, STEPHEN CHENG, Department of Polymer Science, College of Polymer Science and Polymer Engineering, The University of Akron — Giant surfactants are a class of tadpole-shaped hybrid nanomaterials with a functional nanoparticle as the head group and a polymer chain as the tail, such as perfluorochain-functionalized polyhedral oligomeric silsesquioxane end-capped poly( $\epsilon$ -caprolactone) (FPOSS-PCL). The self-assembly of FPOSS-PCL with different composition in bulk were studied using DSC, SAXS, WAXD, and TEM. The compact arrangement of the perfluorochains on the POSS nanoparticles clearly distinguishes them from the polymer chain, leading to the formation of nanophase-separated supramolecular structures such as spheres, cylinders, and bilayered lamellae. This physical picture is rather unusual and quite reminiscent to that observed in the aggregates of small-molecule surfactants. The striking similarity indicates the importance in tuning the interactions to control the hierarchical structure formation in hybrid nanomaterials.

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