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Self-Assembly of Polyhedral Oligomeric Silsesquioxane-Based Giant Molecular Shape Amphiphiles YIWEN LI, STEPHEN CHENG, Department of Polymer Science, The University of Akron, Akron, OH, 44325 — A series of giant molecular shape amphiphiles based on functional polyhedral oligomeric silsesquioxane (POSS) particles was designed and synthesized. The supramolecualr structures of these assemblies along with the resulting ordered structures are fully investigated to determine their structure-property relationships. For example, functional POSS cages with different surface chemistry and sizes were employed to construct dumbbell- and snowman-like molecular Janus particles with various symmetry breakings. These particles could self-organize into hierarchically ordered supramolecular structures in the bulk. Another illustrating example is a series of novel giant surfactants, lipids and gemini surfactants possessing a hydrophilic POSS head and polymer or alkyl chain tails. Diverse architectures of this class of materials have been constructed and their self-assembly processes in solution and bulk state have been discussed. This set of research results not only has general implications in the basic physical principles underlying their self-assembly behaviors, but also create unique materials for developing advanced technologies by combining the properties of hybrid materials

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