

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Frank-Kasper and other superlattice formations in a set of giant molecules having AB_n type of Janus particles XUEYAN FENG, YIWEN LI, MINGJUN HUANG, CHI-HAO HSU, STEPHEN Z.D. CHENG, University of Akron — A novel serial of precisely defined giant molecules having AB_n type of Janus particles has been designed and synthesized. They are consisted of one functionalized hydrophilic polyhedral oligomeric silsesquioxane (POSS) (A) connected with different number of hydrophobic POSS cages (B, n=2-6). With variation of the interaction functional groups on A and the number of the coordinated hydrophobic POSS B, different superlattice structures could be formed at a sub-10-nm scale. For example, the superlattice structure of DPOSS-BPOSS2 (DPOSS represents seven hydroxyl group functionalized POSS and BPOSS represents isobutyl POSS) could change from a double-dyroids phase to a hexagonally packed cylinder phase with increasing temperature, due to an order-order transition in the weak segregation region. For DPOSS-BPOSS3 and DPOSS-BPOSS4, both of these giant molecules could form A15 phase, which is a Frank-Kasper phase. With deep understanding of this set of model AB_n type giant molecules based on the POSS nano atoms, it may be promising to construct new generations of giant molecules for further development of functional materials with desired structures and macroscopic properties.

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Date submitted: 13 Nov 2014

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