

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Guiding Rules for Self-Assembly of Patchy Particles SHARON

GLOTZER, Department of Chemical Engineering and Materials Science and Engineering, University of Michigan, TING CHEN, Department of Chemical Engineering, University of Michigan, ZHENLI ZHANG, Department of Chemical Engineering, University of Michigan — The functionalization and patterning of nanoparticle and colloidal building blocks with organic and biomolecular ligands provides new possibilities for directing their self-assembly into complex structures for novel materials and devices. We seek to develop an intuitive and general framework for predicting the assembly of building blocks functionalized at specific locations with patches of attractively-interacting molecules. We present the results of molecular simulations of the self-assembly of spherical and cone-shaped particles decorated with sticky patches. We relate the geometry of polyhedral terminal structures formed from small numbers of particles, to geometrical details of the building blocks and the anisotropy of the patch patterns. We compare the structures obtained in our simulations with colloidal polyhedra formed by droplet evaporation.

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Date submitted: 08 Dec 2004

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