Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Crystallographic Tailoring: Self-Assembling Complex Crystals Through Building Block Design PABLO F. DAMASCENO, Applied Physics, MICHAEL ENGEL, Chemical Engineering Department, SHARON C. GLOTZER, Materials Science and Engineering Department, University of Michigan, Ann Arbor MI — A primary challenge for the development of bulk, scalable and high yield materials with interesting properties is the limited number of structures that can be obtained via self-assembly of nano and micrometer sized particles. To increase this variability, several suggestions have been proposed among which the exploration of new anisotropic building blocks have received much attention. Here we present the results of a systematic and extensive computational study of hard polyhedral particles [1,2] and their subsequent assembly into a diverse range of complex structures. Our results show that 1) by utilizing more complex, anisotropically designed building blocks new structures can be self-organized purely from entropy maximization principles and, 2) a predictive criteria for assembly can be formulated, allowing for specific choices of building blocks given a target structure to be self-assemble. [1] Pablo F. Damasceno, Michael Engel & Sharon C. Glotzer. ACS NANO (2012). [2] Pablo F. Damasceno, Michael Engel & Sharon C. Glotzer. SCIENCE (2012).

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Date submitted: 09 Nov 2012 Electronic form version 1.4