Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Self-assembly of triangular particles via capillary interactions DESHPREET BEDI, SHANGNAN ZHOU, JOSEPH FERRAR, MICHAEL SOLOMON, XIAOMING MAO, University of Michigan — Colloidal particles adsorbed to a fluid interface deform the interface around them, resulting in either attractive or repulsive forces mediated by the interface. In particular, particle shape and surface roughness can produce an undulating contact line, such that the particles will assume energetically-favorable relative orientations and inter-particle distances to minimize the excess interfacial surface area. By expediently selecting specific particle shapes and associated design parameters, capillary interactions can be utilized to promote self-assembly of these particles into extended regular open structures, such as the kagome lattice, which have novel mechanical properties. We present the results of numerical simulations of equilateral triangle microprisms at an interface, including individually and in pairs. We show how particle bowing can yield two distinct binding events and connect it to theory in terms of a capillary multipole expansion and also to experiment, as presented in an accompanying talk. We also discuss and suggest design principles that can be used to create desirable open structures.

Deshpreet Bedi
University of Michigan

Date submitted: 11 Nov 2016 Electronic form version 1.4