Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Equilibrium shape of colloidal crystals DIMITRIOS MAROUDAS, RAY SEHGAL, Univ of Mass - Amherst — Clusters of colloidal crystals exhibit a wide range of size dependent properties. Leveraging such properties requires a strong fundamental understanding of the thermodynamics of colloidal clusters. A first step in developing this understanding is to accurately describe the equilibrium structure and morphology of these assemblies. In this presentation, we report the results of a generalized Wulff construction that is able to accurately describe the equilibrium, i.e., of minimum free energy, shape of an assembly of colloidal particles. The colloidal system that we focus on is modeled with an interparticle interaction consisting of two terms, an electrostatic repulsion and an Asakura-Oosawa (AO) depletion attraction. The generalized Wulff construction can account for both surface facet and surface edge effects on the stable colloidal crystalline morphology. This construction results in a configuration of minimum free energy for given crystal volume. We carry out these equilibrium shape calculations over a range of crystal sizes to examine size dependent effects on the stability of colloidal clusters. These calculations enable the determination of cluster sizes which exhibit improved stability (lower free energy) compared to that of similar-size clusters.

Ray Sehgal
Univ of Mass - Amherst

Date submitted: 14 Nov 2014 Electronic form version 1.4