Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Novel Non-Close-Packed Structures Assembled by Spherical Colloids with Anisotropic Interactions under Electric Field FUDUO MA, NING WU, Colorado School of Mines — Spherical colloids with isotropic properties have been used as building blocks to assemble a variety of 2D and 3D structures in past, such as FCC, HCP, and BCT crystals. We recently, however, have observed new type of two-dimensional structures under the influence of electric field at the liquid-solid interface. This is primarily due to anisotropic interactions arising from electric field on both particles and aqueous solution. At low concentrations and low frequencies of the electric field, the isotropic spheres can form a series of colloidal clusters, ranging from 3 to 10. The analysis of cluster distributions shows non-trivial peaks for trimer, tetramer, hexamer, and nanomer. Those clusters can change bond angles freely while maintaining the overall structures intact. At high concentrations, those colloidal clusters with flexible bond angles can further assemble and connect themselves into a good variety of two-dimensional non-close-packed networks that have not been observed before. By precisely controlling the electric field strength, frequency, volume fraction of colloids, and ionic strength, we have made diversified non-close-packed structures that have potential applications in photonic crystal, catalysis, or filtration.

Ning Wu
Colorado School of Mines

Date submitted: 19 Nov 2011 Electronic form version 1.4