

The Department of Physics and Astronomy
Presents Research Seminar Speaker

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Friday March 5, 2010
Time: 3:00-4:00 p.m.
Location: MB 0.302

Ionic Driven Self-Assembly

Electrostatic interactions lead to important heterogeneous and reversible assemblies with a large variety of shapes and patterns. Oppositely charged molecules are often co-assemble into units with some inherent asymmetry that renders functionality. Symmetric electrostatic interactions alone are shown to spontaneously break symmetries at the nanometer scale, such as the formation of helical ionic patterns on fibers and the buckling of ionic shells into icosahedra. Through varying the strength of the electrostatic interactions we control the pitch of the helical patterns of the surface of virus-like fibers or of aqueous channels. In ionic spheres, correlations may lead to faceting into icosahedra without rotational symmetry. This buckling appears on vesicles of cationic-anionic molecules, as well as on co-adsorbed charged molecules that form ionic rafts.

- M. A. Greenfield, L. C. Palmer, G. Vernizzi, M. Olvera de la Cruz, and S. I. Stupp "Buckled Membranes in Mixed-Valence Ionic Amphiphile Vesicles" *J. Am. Chem. Soc.*, 131, 12030–12031 (2009).
9. G. Vernizzi, K.L. Kohlstedt, and M. Olvera de la Cruz "On the Electrostatic Origin of Chiral Patterns on Nanofibers" *Soft Matter* 5, 736-739 (2009).
19. G. Vernizzi and M. Olvera de la Cruz "Faceting Ionic Shells into Icosahedra via Electrostatics" *Proc. Natl. Acad. Sci. USA*, 104 (47) 18382-86 (2007).
- K.L. Kohlstedt, F. Solis, G. Vernizzi, and M. Olvera de la Cruz "Spontaneous Chirality via Long-Range Electrostatic Forces" *Phys. Rev Lett.* 99, 030602 (2007).
- S. M. Loverde, F. J. Solis and M. Olvera de la Cruz "Charged Particles on Surfaces: Coexistence of Dilute Phases and Periodic Structures at Interfaces" *Phys. Rev Lett.* 98, 237802 (2007).