Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Active colloids at liquid-liquid interfaces: dynamic self-assembly and functionality ALEXEY SNEZHKO, IGOR ARANSON, Argonne National Laboratory — Self-assembled materials must actively consume energy and remain out of equilibrium in order to support structural complexity and functional diversity. Colloids of interacting particles suspended at liquid-liquid interfaces and maintained out of equilibrium by external alternating electromagnetic fields develop nontrivial collective dynamics and self-assembly. We use ferromagnetic colloidal micro-particles (so the magnetic moment is fixed in each particle and interactions between colloids is highly anisotropic and directional) suspended over an interface of two immiscible liquids and energized by vertical alternating magnetic fields to demonstrate novel dynamic and active self-assembled structures ("asters") which are not accessible through thermodynamic assembly. Structures are attributed to the interplay between surface waves, generated at the liquid/liquid interface by the collective response of magnetic microparticles to the alternating magnetic field, and hydrodynamic fields induced in the boundary layers of *both* liquids forming the interface. Two types of magnetic order are reported. We demonstrate that asters develop self-propulsion in the presence of a small in-plane dc magnetic field. We show that asters can capture, transport, and position target microparticles.

Alexey Snezhko
Argonne National Laboratory

Date submitted: 13 Nov 2011 Electronic form version 1.4