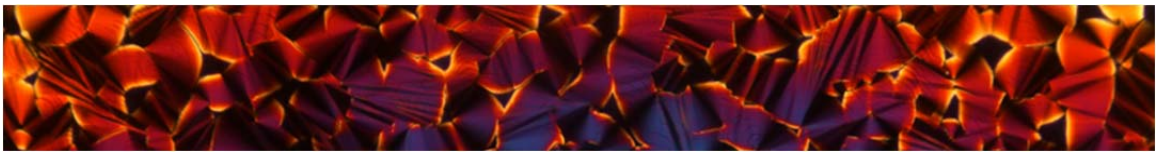


SOFT MATERIALS RESEARCH CENTER

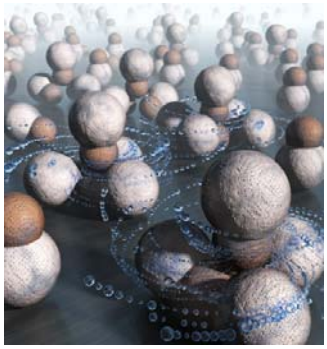
SPECIAL SEMINAR SERIES

In- and Out-of-Equilibrium Behavior of Colloids with Broken Symmetries

Ning Wu

Department of Chemical & Biological Engineering
Colorado School of Mines

Colloids are important for our daily life and modern technologies. Among which the colloidal particles with anisotropic properties in geometry, surface functionality, and chemical composition emerge as an important family of the colloidal genome. Scientifically, the in- and out-of-equilibrium behavior of anisotropic colloids are fundamentally different from conventional particles because of their broken symmetry in particle properties, colloidal interactions, and surrounding fluid flow. Technologically, recent computations predict a number of new optical properties arising from the electromagnetic-field coupling between individual particles in a small cluster and in a periodic array.



In this talk, we will discuss our recent studies of the in- and out-of-equilibrium behavior of anisotropic colloids. In particular, we will show that these particles possess orientation-dependent interactions under applied electric fields. Surprisingly rich structures and crystalline arrays (such as chiral colloidal clusters, Ising-like lattices, graphene-like structures, quasicrystalline mesophases) can be obtained in experiments. Breaking symmetry is also an important strategy to induce propulsion of microscopic objects in low Reynolds number flow. Here, we will describe a new type of particle propulsion mechanism that is based on breaking the symmetry of electrokinetic flow using low power AC electric fields. Both linear and circular motions of colloidal clusters can be conveniently controlled by a wide range of experimental parameters. Our studies not only provides insights in the non-equilibrium physics for active colloids, but also propose new routes for making functional materials based on the building blocks of active colloids.

Wednesday, January 27th at 1:30 p.m. Duane Physics G126

Sponsored by the Soft Materials Research Center
Department of Physics, University of Colorado.

https://smrc.colorado.edu