

## Dynamics of self assembly at the nanoscale

Self-assembly is the autonomous organization of components into patterns or structures by using simple rules. Examples range from large to small: weather patterns, swarms of insects, and molecules all form spontaneously from the interaction of smaller components. Constructing nanoscale systems which can build their own structures by self-assembly is a major technological challenge.

This project considers the interaction of small particles which form aggregates. The goals are (1) formulating a dynamic model based on interparticle forces, (2) numerical simulations of the model, (3) reproducing phenomenon of complex polymer aggregates.

### References:

Whitesides & Grzybowski, Self-Assembly at All Scales, Science (2002).

Zhang et al., Tethered Nano Building Blocks: Toward a Conceptual Framework for Nanoparticle Self-Assembly, Nanoletters, (2003)

Prerequisites: ODEs, some experience with MATLAB. Ideally one or more of: Dynamical Systems (math454), PDEs (math456), Numerical Methods (math475).