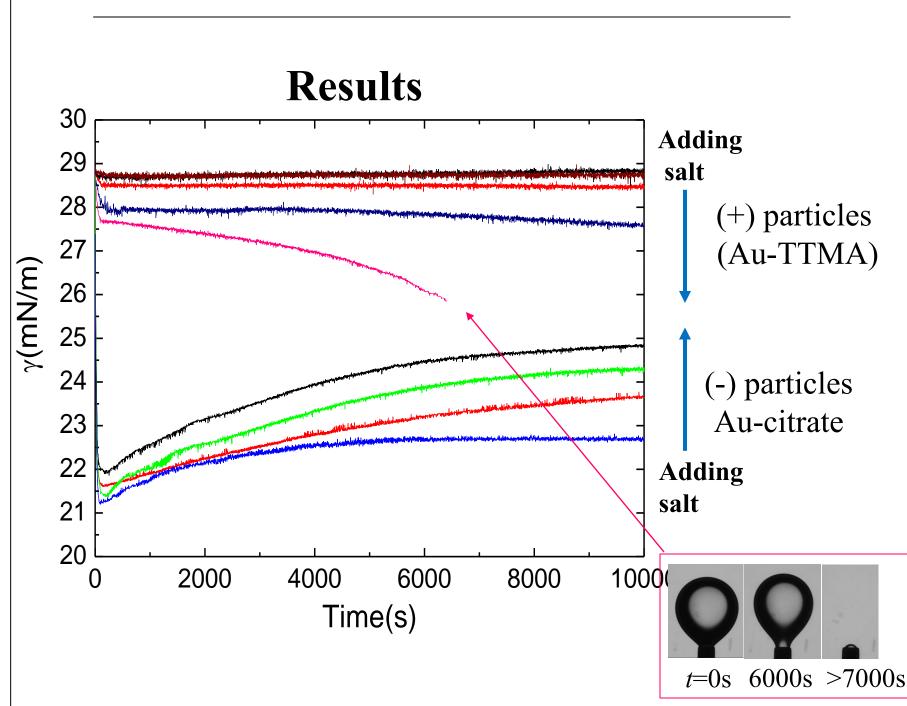


Dinsmore Group – Soft-Matter Physics

http://people.umass.edu/dinsmore/

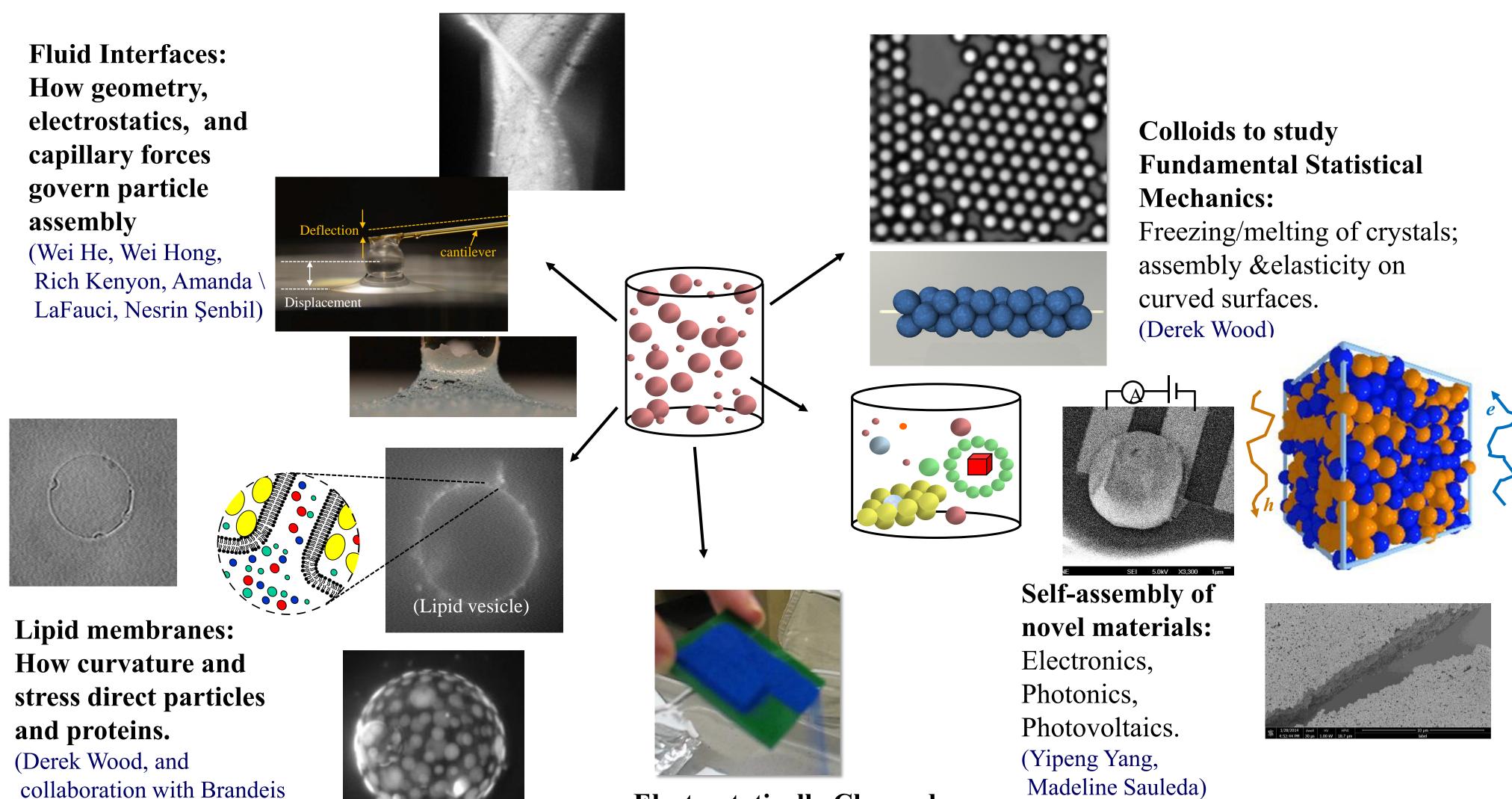
Statistical mechanics of colloids, vesicles, emulsions, suspended nanoparticles, granular media...

Fluid-interface electric potential controls the binding of nanoparticles (Wei Hong, w/ Russell group & Rotello group) Fluid interfaces accumulate charge and electric potential. How can we control them and how do they affect particle binding? Can we find new ways to make large-area composite materials? TTMA = tetra(ethyleneglycol) trimethylammonium



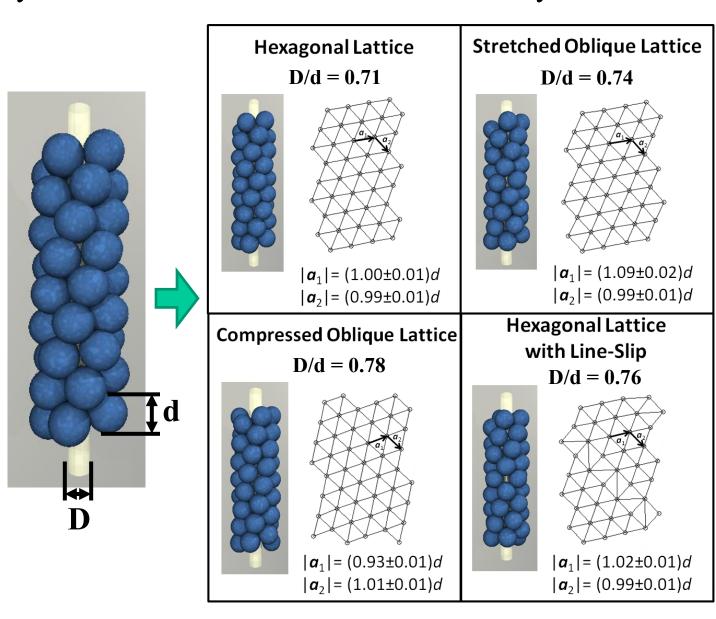
We study the statistical mechanics of soft matter: colloids, vesicles, emulsions, nanoparticle suspensions and other squishy things. Our experiments probe the relationships among inter-particle forces, structure, and dynamics of many-bodied systems -- relationships that are central to research in condensed-matter physics.

We also apply this fundamental understanding to develop materials at the nanometer scale. Self-assembled materials have unique and inspiring mechanical, optical and electronic properties with applications in nanotechnology and biomedical engineering.

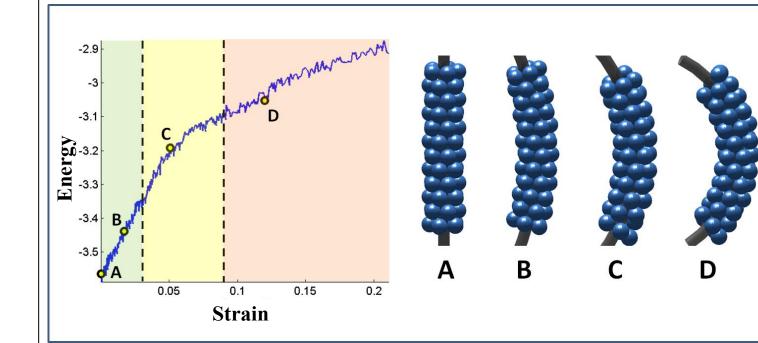


Geometry, Structure & Elasticity (Derek Wood)

How do spheres pack on a cylinder? Computer simulations show that the diameter of the cylinder determines the structure of the crystal lattice...



... Now, how does its crystal lattice affect material properties such as the bending modulus?



What sets the receding contact angle of a drop on a solid?

Nesrin Şenbil, Wei He

☐ Right side

0.10

 $|D_0| (mm^{-1})$

0.00

Univ.)

Contacts between fluid interfaces and solid surfaces arise in diverse settings ranging from water droplets condensing on a surface to particles coating oil droplets in water. The contact angle, θ , between the interface and the solid plays the key role in determining the droplet shape and stability, which are essential in applications such as water-repellant surfaces or Pickering emulsions in the food or oil-recovery industries.

Electrostatically Charged

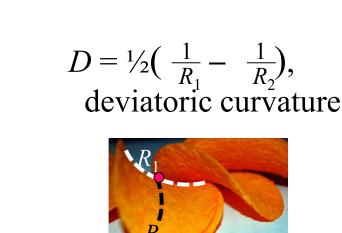
Powders: contact

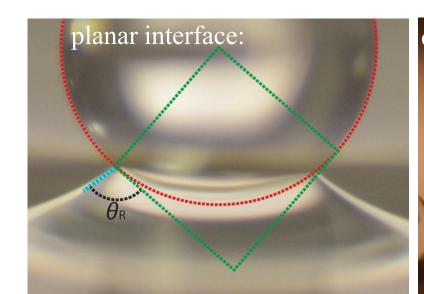
stress & structure

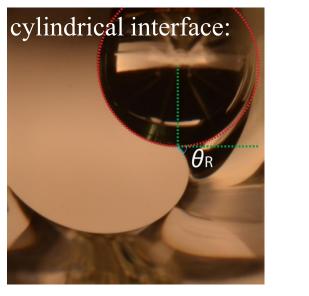
electrification;

(Mark Lewis)

For decades, θ was thought to depend on surface chemistry and topology. We find that it also depends on interface shape: the receding angle can be much lower on a saddle-shaped or cylindrical interface.







We are grateful to the following agencies for supporting this research:









