

CHEMICAL, BIOLOGICAL & MATERIALS ENGINEERING

100 E. Boyd, Sarkeys Energy Center, T-301

405-325-5811

The University of Oklahoma

Norman, Oklahoma

PHILLIPS 66 SEMINAR SERIES, 2017 – 2018

DR. BENJAMIN ROGERS

ASSISTANT PROFESSOR OF PHYSICS
MARTIN A. FISHER SCHOOL OF PHYSICS
BRANDEIS UNIVERSITY
WALTHAM, MASSACHUSETTS

Our seminar

"USING DNA TO PROGRAM COLLOIDAL CRYSTALLIZATION"

DNA is not just the stuff of our genetic code; it is also a means to build new materials. For instance, grafting DNA onto small particles can, in principle, 'program' the particles with information that tells them exactly how to put themselves together into large-scale structures -- they 'self-assemble.' Recent advances in our understanding of how this information is compiled into specific interparticle forces have enabled the assembly of interesting crystal phases, and could be extended to the assembly of prescribed, nonperiodic structures. However, structure is just one piece of a more complicated story; in actuality, self-assembly describes a phase transition between a disordered state and an ordered state, or a pathway on a phase diagram. In this talk, I will present experiments showing that information stored in DNA sequences can be used to design the entire assembly pathway, and not just its endpoint. Using free DNA strands that either induce or compete with binding between particles, I will show that it is possible to create suspensions with new types of phase behavior, such as freezing upon heating, and reversible transitions between different solid phases. I will also discuss preliminary experiments showing that we can measure directly the dynamics of these colloidal phase transitions, using a combination of techniques from droplet-based microfluidics, video microscopy, and image analysis. Going forward, this work could prove especially useful in nanomaterials research, where a central goal is to manufacture functional materials by growing them directly from solution.

TUESDAY, APRIL 3, 2018
COOKIES AND COFFEE -- 2:50 P.M.
SEMINAR -- 3:00 P.M.
SARKEYS ENERGY CENTER, A-235

THIS IS A REQUIRED SEMINAR FOR CHE 5971

Accommodations on the basis of disability are available by contacting the office.