

THE UNIVERSITY



OF HONG KONG

DEPARTMENT OF MECHANICAL ENGINEERING

## SEMINAR

**Online**

**Title:** Using rheo-optical methods to probe colloidal gels and biopolymer composites

**Speaker:** Dr. Ryan McGorty  
Associate Professor  
Department of Physics and Biophysics  
University of San Diego  
USA

**Date:** 21 April, 2022 (Thursday)

**Time:** 10:30 a.m. (Hong Kong Time)

**Zoom meeting:** 1) Link to join the meeting:  
<https://hku.zoom.us/j/93371288836?pwd=blhKRINIUU1YdDVFLzhHMXPkR1ZlZz09>

2) Meeting ID: 93371288836

3) Password: 561375

**Abstract:**

This talk will highlight a couple research projects by the soft matter and biophysics research group at the University of San Diego. In both projects, we couple a commercial rheometer with an optical microscope to allow simultaneous measurements of the bulk rheology with microscopic structure and dynamics. In the first project, we study the shear driven formation of aggregates and flocs in suspensions of

attractive micron-sized thermosensitive microgel colloidal particles. We find that we can use shear flow to control the shape of colloidal clusters which comprise the gel. Tuning the shape of these clusters allows us to control the stiffness of the gels. Furthermore, we find that shearing these colloidal gels often results in macroscopic vorticity aligned log-like flocs. In the second project, we measure the rheology, on both the macro and micro scales, of composites containing ring and linear DNA molecules. We find non-monotonic relationships between both the macro- and micro-rheological properties with the fraction of DNA in our composites. I will explain how we employ differential dynamic microscopy to measure the microrheological properties of these samples. As the University of San Diego is a primarily undergraduate institution, I will also be highlighting the research environment in labs comprised mostly of undergraduate students.

#### **Short Biography:**

Ryan McGorty is an Associate Professor at the University of San Diego in the Department of Physics and Biophysics. Previously, he was a postdoctoral fellow at the University of California, San Francisco where he worked on super-resolution microscopy techniques. He received his PhD in Physics from Harvard University where he studied how colloidal particles interact with liquid interfaces using digital holographic microscopy. His current undergraduate-driven research lab focuses on developing novel optical microscopy techniques to study colloidal fluids and gels, biopolymer solutions, and reconstituted cytoskeleton networks. Lab website: <https://rmcgorty.github.io/>



**ALL INTERESTED ARE WELCOME**

**For further information, please contact Prof. A.H.C. Shum at  
ashum@hku.hk**

**Research areas: Advanced Materials and Biomedical Engineering**