

Department of Electrical and Computer Engineering



TEXAS TECH UNIVERSITY

Edward E. Whitacre Jr.
College of Engineering

Fall 2023 Seminar Series

Seminar Title: *Magneto-Capillary Dynamics of Amphiphilic Janus Particles at Curved Liquid Interfaces*

Time: 2:00-2:50 PM, Friday, Oct 6, 2023

Location: Biology 101

Speaker:

Wenjie Fei

Department of Civil, Environmental, and Construction Engineering, Texas Tech University

Abstract:

It is commonly held that static homogenous fields cannot be used to drive the translational motions of magnetic colloids. Such field can exert no net force but torque on a colloidal particle. However, by coupling particle orientation to its position on a curved interface, even static homogenous fields can be used to drive rapid particle motions. Here, we demonstrate this effect using magnetic Janus particles with amphiphilic surface chemistry adsorbed at spherical interface of a water drop in decane. The particles move along the drop surface to align their magnetic moments parallel to the applied field, as explained quantitatively by a model that accounts for the magnetic torque on the particle and the constraints imposed by the interface. Notably, the effective magnetic force experienced by particles adsorbed on small drops can be many orders of magnitude larger than those due to field gradients. This mechanism may be useful in creating highly responsive emulsions and foams stabilized by magnetic particles.

Speaker Bio:

Dr. Wenjie Fei is an instructor in the Department of Civil, Environmental, and Construction Engineering at Texas Tech University (TTU). She received her Ph.D. in Chemical Engineering in 2019 from Columbia University in the areas of colloids and interface science. Prior to joining TTU, she worked as a research scientist in the Coatings Innovation Center at PPG Industries. Her research focuses on developing stimuli-responsive materials for biomedical and environmental applications.