

2018 Fall Chem 501 Seminar



Dr. Lei Zhu

Department of Macromolecular Science and Engineering



Thursday – September 13, 2018

Refreshments 3:25pm, Buehler 513

Lecture at 3:45pm, Buehler 555

<http://www.case.edu/cse/emacs/leizhu>

Hosted by: Dr. Bin Zhao

“High Energy Density and Low Loss Dielectric Polymers for Electrical Applications”

High dielectric constant polymers find numerous advanced electrical and power applications such as pulsed power, power conditioning, gate dielectrics for field-effect transistors, electrocaloric cooling, and electromechanical actuation. Unfortunately, it is generally observed that polymers do not have high dielectric constants (only 2-5) and high polarization tends to cause a significantly dielectric loss. Therefore, it is highly desirable that the fundamental science of all types of polarization and loss mechanisms be thoroughly understood for dielectric polymers. In this presentation, we intend to explore advantages and disadvantages for different types of polarization. Among a number of approaches, orientational polarization is promising for high dielectric constant and low loss polymer dielectrics, if the dipolar relaxation peak can be pushed to towards the gigahertz range. In particular, dipolar glass, paraelectric, and relaxor ferroelectric polymers will be discussed for the orientational polarization approach.

Professor Lei Zhu received his B.S. degree in Materials Chemistry in 1993 and M.S. degree in Polymer Chemistry and Physics in 1996 from Fudan University. He received his Ph.D. degree in Polymer Science from University of Akron in 2000. After two-year post-doctoral experience at the Maurice Morton Institute, University of Akron, he joint Institute of Materials Science and Department of Chemical, Materials and Biomolecular Engineering at University of Connecticut, as an assistant professor. In 2007, he was promoted to associate professor with tenure. In 2009, he moved to Department of Macromolecular Science and Engineering at Case Western Reserve University as an Associate Professor. In 2013, he was promoted to full Professor. His research interests include high κ polymer and organic-inorganic hybrid nanomaterials for high energy density capacitor applications, development of artificial antibody as nanomedicines, and supramolecular self-assembly of discotic liquid crystals. He is recipient of NSF Career Award, 3M Non-tenured Faculty Award, DuPont Young Professor Award, and Rogers Teaching Excellence Award. He is author and co-author of 160 refereed journal publications and 6 book chapters. He delivered over 150 invited talks and 45 contributed presentations, and his total citation is 7100 times with an h-index of 47 (Google Scholar).