



POLYMER PROGRAM SEMINARS

POLYMER PROGRAM SEMINAR

Friday, March 15th, 2019

11:10 AM, IMS 20

Steve Lustig,

Northeastern University

“Viscoelasticity with Twist-Tie Knots in Liquid Crystalline Polymer”

Abstract: High molecular weight, lyotropic liquid crystalline polymers remain a very important class of high-performance materials. The achievement of superlative strength requires scrupulous control of inter-molecular alignment and mesoscale order. Such control necessarily starts from solution phases before the materials are formed into fibers, films and other solid forms. Although such polymers have been known for over 50 years, new technologies continually arise from the application of experimental and theoretical advances. Of particular concern is controlling the combination of ordered crystalline behavior and high molecular weight viscoelasticity. For example concentrated liquid crystalline solutions of poly(para-phenylenediamine terephthaloyl), PPDT, resist forming a single, homogeneous nematic phase and retain rheological elasticity. A novel experimental characterization, Rheo-Raman, combines simultaneous shear rheometry and polarization-sensitive resonance-enhanced Raman scattering. Measurements with and without light detection at magic angles support the contention that the solution orientation remains spatially heterogeneous, even at significantly high shear rates and long times. New theory and simulations support the contention that PPDT chains entangle to form twist-tie knots at sufficient lengths and concentrations.

Bio: Steve Lustig joined the Department of Chemical Engineering at Northeastern University as an associate professor in September 2016. Before moving to Boston, he was an adjunct professor at the University of Delaware in the Department of Chemical and Biomolecular Engineering and the Department of Materials Science and Engineering, where he taught statistical thermodynamics, polymer physics and green engineering for 8 years. He was a principal investigator at the DuPont Central Research & Development laboratories at Experimental Station in Wilmington, Delaware for 26 years. In 2013 he was awarded the AIChE Industrial Research & Development Institute Award for his work at DuPont. In his spare time, he enjoys welding metal sculpture and sailing with his family.

For more information, please contact Osker Dahabsu at osker@uconn.edu or visit polymer.ims.uconn.edu