

## **AEC COMMUNITY SEMINARS**

**Date: September 20, 2016**

**Time: 1:00pm**

**Location: Advanced Energy Center, Rm 104**

### ***“Linear Viscoelasticity of Associating Ionomers”***

**By**

**Prof. Ralph H. Colby**

**Materials Science and Engineering, Penn State University**

A simple sticky Rouse model with three parameters is applied to the LVE of short chain ionomers. The glassy modulus and monomer relaxation time are two parameters common to all molecular polymer models. The third parameter is the association lifetime  $\tau$  that can be directly observed in dielectric spectroscopy, as a large relaxation where ions start to move. We apply this model to (1) short polyester sulfonate ionomers based on either poly(ethylene oxide) (PEO) or poly(tetramethylene oxide), (2) short polysiloxane ionomers with a random mixture of phosphonium and poly(ethylene oxide) side chains, (3) long-chain random copolymers of styrene sulfonate and methacryl-PEO side chains and (4) lightly sulfonated styrene oligomers. In each case, knowing the molecular weight distribution and  $\tau$  from dielectric measurements allows the full linear viscoelastic response to be understood with the sticky Rouse model. More recently we have developed a sticky double reptation model to understand the LVE of entangled sulfonated polystyrene ionomers using the same association lifetime  $\tau$  that the oligomers demonstrated.

***“Coffee & snacks will be provided during the talk”***