**Membrane-based fractionation of complex mixtures**

Ryan P. Lively

Professor, School of Chemical and Biomolecular Engineering, Georgia Institute of Technology

Director, Center for Understanding and Control of Acid Gas-Induced Evolution of Materials for Energy (UNCAGE-ME) an Energy Frontier Research Center of the US Department of Energy

**Abstract**

The rapid increase in global industrialization necessitates technology shifts in energy production, manufacturing, and carbon management techniques. Approximately 10-15% of global energy use can be attributed to separation processes, with the vast majority of separations being “thermal” in nature (e.g., distillation). Membranes can augment or potentially disrupt certain incumbent technologies, but issues of perceived risk/reliability, scalability/cost, and performance must be addressed for membranes to move towards world-scale sectors such as hydrocarbon processing. The polymer processing platform for the creation of membrane devices is eminently scalable and has the potential to match the enormous volumes associated with chemical and petrochemical separations. Polymeric organic solvent reverse osmosis (OSRO) and organic solvent nanofiltration (OSN) membranes with the capabilities of fractionating complex mixtures have recently emerged and will be the focus of this talk. Specifically, we will discuss enabling materials for this separation challenge as well as methods to estimate the fluxes of various components in a complex mixture based on a relatively small number of single component experiments or in some cases no experimental data at all. Current challenges in the area of OSRO/OSN will be presented in addition to promising paths forward in this emerging area of membrane science.