HAJIM SCHOOL OF ENGINEERING AND APPLIED SCIENCES
UNIVERSITY of ROCHESTER

Department of Chemical Engineering presents

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Goergen Hall 101 @ 3:25pm

"Structure-Property-Performance Relationships in Polymer Membrane Systems"

The successful development of polymeric materials for use as gas separation membranes requires the determination of fundamental materials science relationships that link polymer chemistry and physical behavior to desired outcomes in separation performance. Over the last decade, our research group at the University of Kentucky has examined a range of emerging membrane material platforms with a focus on the characterization of relaxation dynamics in these membranes and their relation to polymer structure, free volume and separation properties. This work has helped to identify key aspects of polymer composition, architecture and morphology in establishing design rules for the tailoring and optimization of gas separation membrane materials. The presentation will touch on three classes of gas separation membrane polymers: rubbery amorphous networks with high ethylene oxide content for CO2 separations, as well as nanocomposite membranes and thermally-modified aromatic polyimides with exceptional permeability and thermal/chemical resistance. In each case, dynamic thermal analysis techniques (*i.e.,* dynamic mechanical analysis and broadband dielectric spectroscopy) have been used to elucidate the sub-glass and glass-rubber relaxation characteristics of the polymers as related to their structural details and formulation history. Information obtained through these methods provides valuable insight as to inherent segmental mobility and motional constraint, relaxation environment, and their influence on small molecule transport.