Seminar

Wednesday, October 18, 2017

11:00 AM – 206 Furnas Hall

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Hierarchically Functional Polymers for Advanced Membrane Applications

Hierarchically function polymer membranes with good chemical, mechanical, and thermal stability in the process environment are needed in many emerging energy and environment technologies, ranging from membranes for gas separation (e.g., carbon capture), water purification (e.g., desalination), to clean energy production (e.g., fuel cell). In the Guo group at the University of Notre Dame, we are focused on molecularly engineering polymer and polymer-based membranes that are both structurally and functionally rich for a variety of potential applications, with particular interests in gas separation membranes and polyeletrolyte membranes (PEM) for fuel cells. This talk presents our recent efforts of developing a new membrane platform based on iptycene-containing polymers. The rich structural hierarchy and chemistry versatility of iptycenes offer great opportunities for generating well-defined yet tailorable microstructures as well as introducing unique supramolecular interactions that synergistically lead to intriguing membrane properties. Two representative series of iptycene-polymer membranes will be discussed for gas separation and fuel cell applications, respectively, each exploiting a unique structural motif to achieve desired membrane performance. Specifically, iptycene-based microporous membranes with superior size sieving ability and triptycene-based multiblock copolymer PEMs with greatly reduced swelling behavior and high proton conductivity will be presented. The discussion will emphasize how to exquisitely tune the molecular structure/architecture to promote size-sieving and regulate microstructures in these novel polymer membranes.

Refreshments at 10:45

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