Michael Z. Hu, Madridge J Nanotechnol Nanosci. 2019
http://dx.doi.org/10.18689/2638-2075.a4.001

Membrane Nanomaterials Technology for Renewable Energy and Desalination

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Development of nanostructures, interfaces and surface functionalities in advanced membrane materials are important to the membrane separation performances (molecular transport flux, separation selectivity, durability and long-term stability). Supported thin-layer hybrid material membranes represent a class of high-flux membranes when fast-transporting building-block interfaces and chemistry are introduced into the layer of cross-linked polymer and/or graphene oxide (GO) sheets. Both nanoscale engineering of nanostructure (such as GO dimension, interspacing, orientation and connectivity) and molecular engineering of the cross linking and functionality (such as sulfonic acid site) matter to the membrane layer performance. Fast water-transporting membrane is an example with many applications such as in biofuel and bioproduct processing, in water treatment & desalination and in energy storage devices such as super capacitors. The speaker will highlight some recent year's research on the advanced membrane materials synthesis on superhydrophobic porous membranes, superhydrophilic polymer membranes and hybrid membranes with graphene oxide sheet assembly crosslinked or dispersed into the polymer coating materials. In addition, a solar-driven membrane desalination concept will be discussed as one example application for superhydrophobic porous nanomaterials.

Biography:

Michael Z. Hu is a chemical engineer and biochemical engineer by education, serving as a Senior Research Staff Member at the Oak Ridge National Laboratory. Meanwhile, he is appointed by the University of Tennessee as a Joint Faculty Professor at the UT Bredesen Center and an Adjunct Professor at the Chemical & Biomolecular Engineering Dept. He is the Founder Editor-in-Chief for the *Journal of Nanomaterials*. Dr. Hu's research is in advanced nanomaterials and chemical processing technologies for separations and catalysis. He is a team leader for a Department of Energy (DOE) program that has won a 2014 R&D100 Award based on advanced nano-membranes research.