

Membrane Materials ~ Theory, Chemistry & Structure

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Since the first commercially viable desalination membranes were introduced nearly 50 years ago, there has been enormous innovation in the composition and functionality of membrane materials. Much of this progress has been applications driven wherein a new membrane was designed to address a specific need, such as kidney dialysis, gas separations, water softening, or food processing. A fundamental theme in new membrane development has been the minimization of membrane fouling, particularly biofouling, as well as the enhancement of resistance to chemical/environmental attack. This presentation will review the evolution of membrane separations technologies, including theoretical considerations about how membranes function and the materials from which they are constructed. Recent advances in the materials sciences, molecular biology, and nanofluidics has presented novel opportunities for making more exotic membranes whose flux and rejection behaviors can be actively manipulated *in situ*. Contemporary trends in the design of new membrane materials will be explored and their potential for commercial applications assessed.