

Nanofibrous Composite Membranes: Synthesis, Characterization and Applications to Water Purification

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The availability of clean water has emerged as one of the most critical problems facing society and the global economy in the 21st century. Already there is insufficient availability of clean water for human consumption, agriculture and industry. According to the World Resources Institute, 2.3 billion people (~40% of the world's population) live in water-stressed areas. The problem will get much worse unless we develop more efficient and cost-effective technologies to extract clean water from impaired water including wastewater, brackish water and seawater. Pressure-driven membrane processes such reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF) and microfiltration (MF) have become the key components of advanced water reuse and desalination systems throughout the world. Recent advances in nanotechnology such as the fabrication of polymeric nanofibers by electrospinning are providing new opportunities to develop a new generation of high performance filtration media and membranes for water purification. In this presentation, I will give an overview of recent advances on the synthesis, characterization and applications of nanofibrous composite (NFC) membranes to water purification. More specifically, I will summarize recent results from our group on the development of ion-selective NFC membranes for water treatment and reuse.