

# **Science and Technology for Sustainable Water Supply**

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Increasing global water scarcity and degradation in the quality of available water supplies present a grave challenge to the present and future health, welfare, and prosperity of the world's people. Desalination of seawater and saline aquifers and reuse of industrial or municipal wastewaters are viable avenues to increase water availability beyond that attainable from the hydrogeological cycle. Traditional methods for water purification, however, are chemical and energy intensive. Highly effective, low-cost, robust technologies for augmenting water supplies are needed, with minimal impact on the environment.

Recent advances in the science and technology of water purification are presented, focusing on desalination and water reuse technologies. Major developments in these technologies are made possible due to recent advances in materials science, nanotechnology, and the fundamental understanding of the physics/chemistry of the solid-water interface. Among the topics discussed in this presentation are the development of fouling-resistant membranes for water treatment, use of interfacial force measurements to elucidate the antifouling mechanism of water treatment membranes, highly permeable reverse osmosis membranes incorporating nanomaterials, bio-inspired high flux desalination membranes, robust systems for wastewater reuse, and novel desalination technologies that may dramatically alter the energy/water nexus. These technologies are discussed in the context of the global challenges in water supply and energy.