Abstract Submitted
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Vapor transport through short hydrophobic nanopores for desalination[1] JONGHO LEE, SEAN O'HERN, Massachusetts Institute of Technology, TAHAR LAOUI, FAIZUR RAHMAN, King Fahd University of Petroleum and Minerals, ROHIT KARNIK, Massachusetts Institute of Technology — We propose a concept for desalination of water by reverse osmosis (RO) using a vapor-trapping membrane composed of short hydrophobic nanopores and separates the salt water (feed) and the fresh water (permeate) on each side. The feed water is vaporized by applied pressure and the water vapor condenses on the permeate side accompanied by recovery of latent heat. A probabilistic model based on rarified gas conditions predicted 3-5 times larger mass flux by the proposed membrane than conventional RO membranes at temperatures in the range of 30-50C. To realize the short hydrophobic nanopores, gold was deposited at the entrance of alumina pores followed by SAM formation. The fraction of leaking pores was confirmed to be less than 0.2% using a calcium ion indicator (Fluo-4). Finally, a microfluidic flow cell was fabricated for characterizing the transport properties of the membranes.

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Jongho Lee
Massachusetts Institute of Technology

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