

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Design of Microporosity in Membrane Distillation TOM ZHAO, NEELESH PATANKAR, Northwestern University — Membrane Distillation (MD) is a desalination method where only vapor can pass through pores in a hydrophobic membrane. Unlike reverse osmosis, MD is insensitive to feed salinity (osmotic pressure) and demonstrates near 100% salt rejection in processing wastewater with a high concentration of nonvolatile impurities. To maximize vapor flux and maintain salt rejection, we demonstrate using molecular dynamics the critical pore radius below which the liquid feed will not intrude or nucleate inside the pores for cylindrical, re-entrant and conical pore geometries. We note that re-entrant structures not only can process low surface-tension wastewater due to its inherent oleophobicity, but can also be optimized to achieve maximum vapor transport compared to all other pore geometries as a function of the material hydrophobicity.

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Date submitted: 30 Jul 2017

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