

Sonny Astani

Department of Civil and Environmental Engineering

USC **Viterbi**
School of Engineering



SEMINAR

Dr. Shihong Lin
Assistant Professor, Department of Civil and Environmental
Engineering and the
Department of Chemical and Biomolecular Engineering
Vanderbilt University

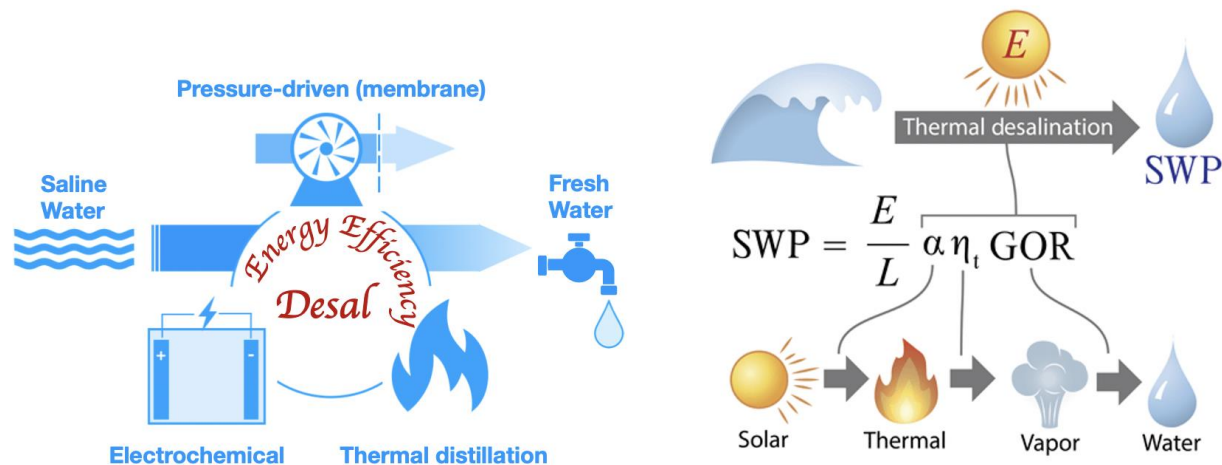
Virtual Seminar
Monday, September 14, 2020
4:00-5:00 PM

Energy Efficiency of Desalination and Solar Thermal Desalination

Abstract

Desalination has become an essential toolset to combat the worsening water stress resulting from population and industrial growth and exacerbated by climate change. Various technologies have been developed to desalinate feedwater with a wide spectrum of salinity. While energy consumption is an important consideration in many desalination studies, it is challenging to make (intuitive) sense of energy efficiency due to the different mechanisms of various desalination processes and the very different separations achieved. In this first part of this presentation, I aim to provide an intuitive, thermodynamics-based interpretation of energy efficiency by illustrating how energy consumption breaks down into minimum energy of separation and the irreversible energy dissipation. I will compare the energy efficiencies of different desalination processes and rationalize the comparison results based on the working mechanisms of different desalination technologies. In the second part of the presentation, I will present a universal framework for analyzing the performance of solar thermal desalination (STD)—a topic with

increasing interest in recent years. This framework can guide the optimization of designing high-performance STD.



doi.org/10.1021/acs.est.9b04788

<https://advances.sciencemag.org/content/5/7/eaax0763>

Bio

Dr. Shihong Lin is an assistant professor in the Department of Civil and Environmental Engineering and the Department of Chemical and Biomolecular Engineering at Vanderbilt University, Nashville. He obtained his Ph.D. (2012) and M.S. degrees from Duke University, and his B.Sc. (2006) from Harbin Institute of Technology, China, all in Environmental Engineering. Dr. Lin did his postdoc at Yale University in 2013-2014, before starting his position at Vanderbilt in 2015. He directs a research group with primary interest in advancing water treatment and desalination technologies via (1) enhancing fundamental understanding of these technologies from molecular to system level, and (2) developing new processes and materials that lead to higher efficiency, reliability, and versatility. Using both experimental and modeling techniques, Lin's research group has worked on a wide spectrum of desalination technologies, including reverse osmosis, nanofiltration, capacitive deionization, membrane distillation, electrodialysis and forward osmosis. Notable awards Dr. Lin has received include the ACS-PRF Doctoral New Investigator Award (2016) and the ORAU Ralph Powe Junior Faculty Enhancement Award (2016). He is currently the associate editor of *Journal of Water Process Engineering* and *Chemical Engineering Journal Advances*.

