

SETO CSP Program Summit 2019

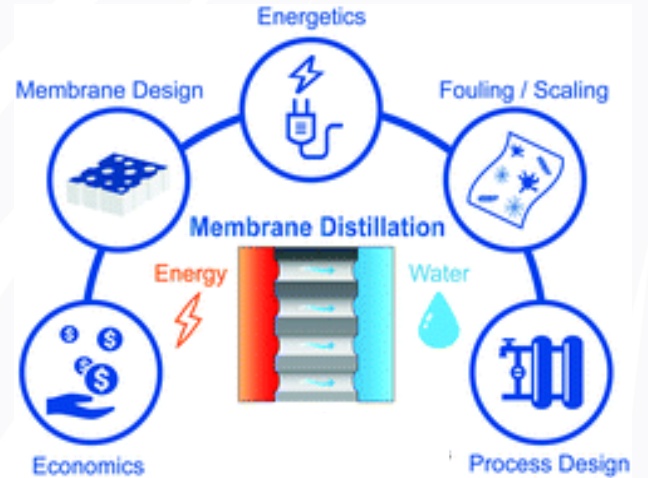
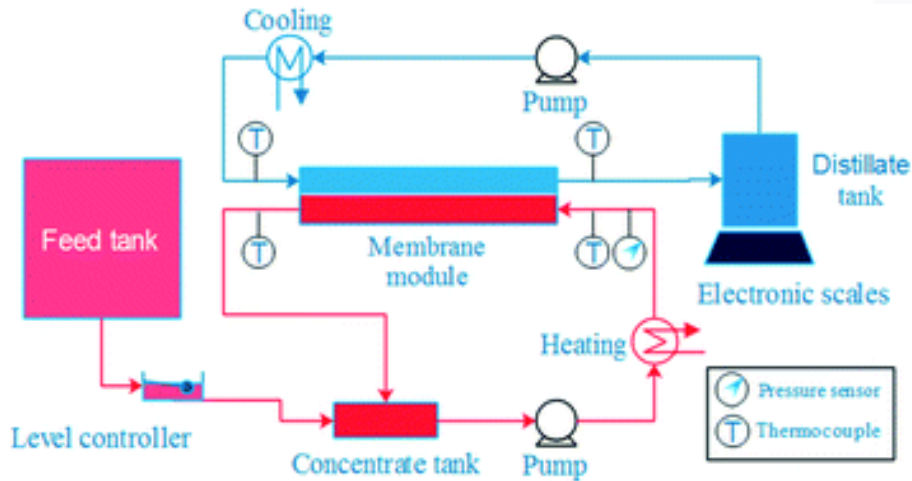
Energy Where it Matters: Delivering Heat to the Membrane/Water Interface for Enhanced Thermal Desalination

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Presenter: Jingbo Wang

Background and motivation



Yan et al. *Environmental Science: Water Research & Technology* 4.3 (2018): 428-437.

Deshmukh et al. *Energy & Environmental Science* 11.5 (2018): 1177-1196.

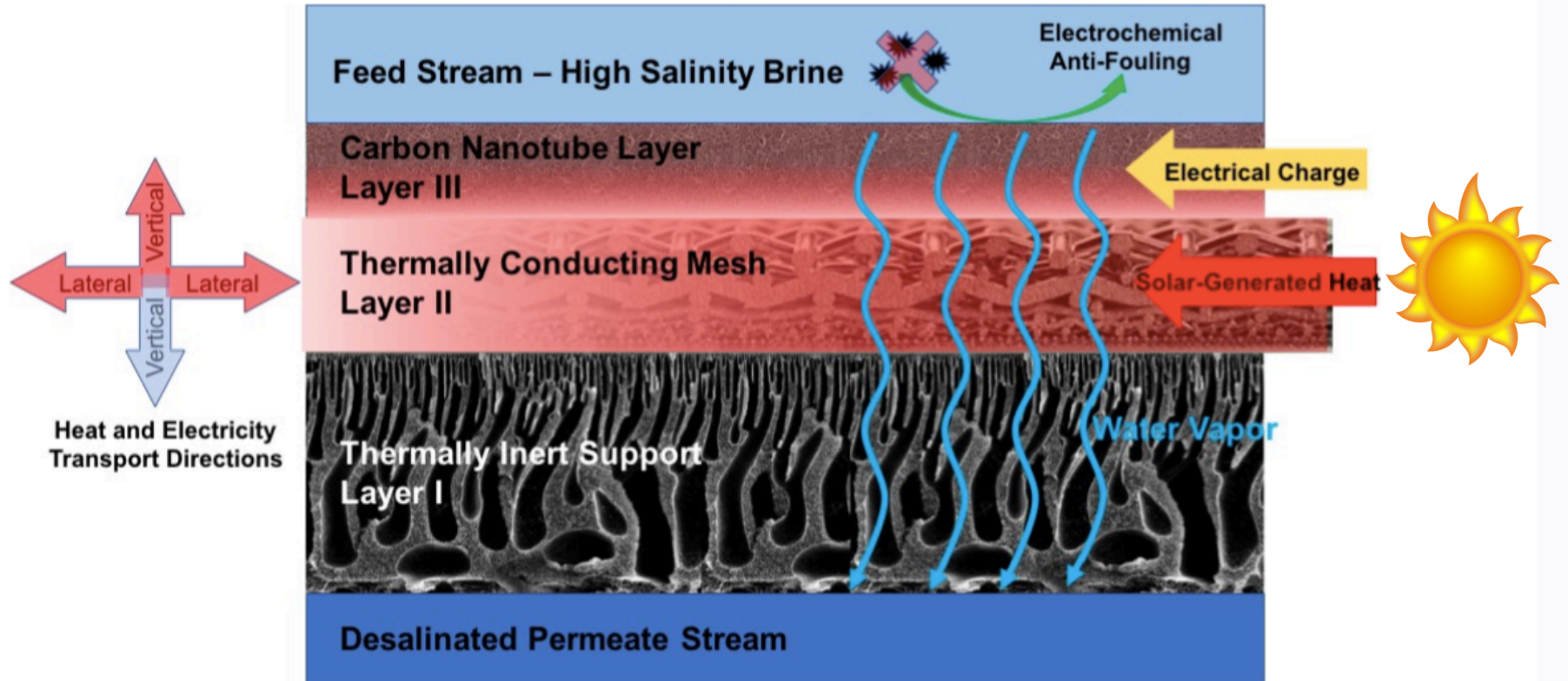
Overall objective

- Develop a transformative thermally-driven membrane distillation (MD) desalination technology that allows heat to be delivered directly to the **membrane/water interface**.

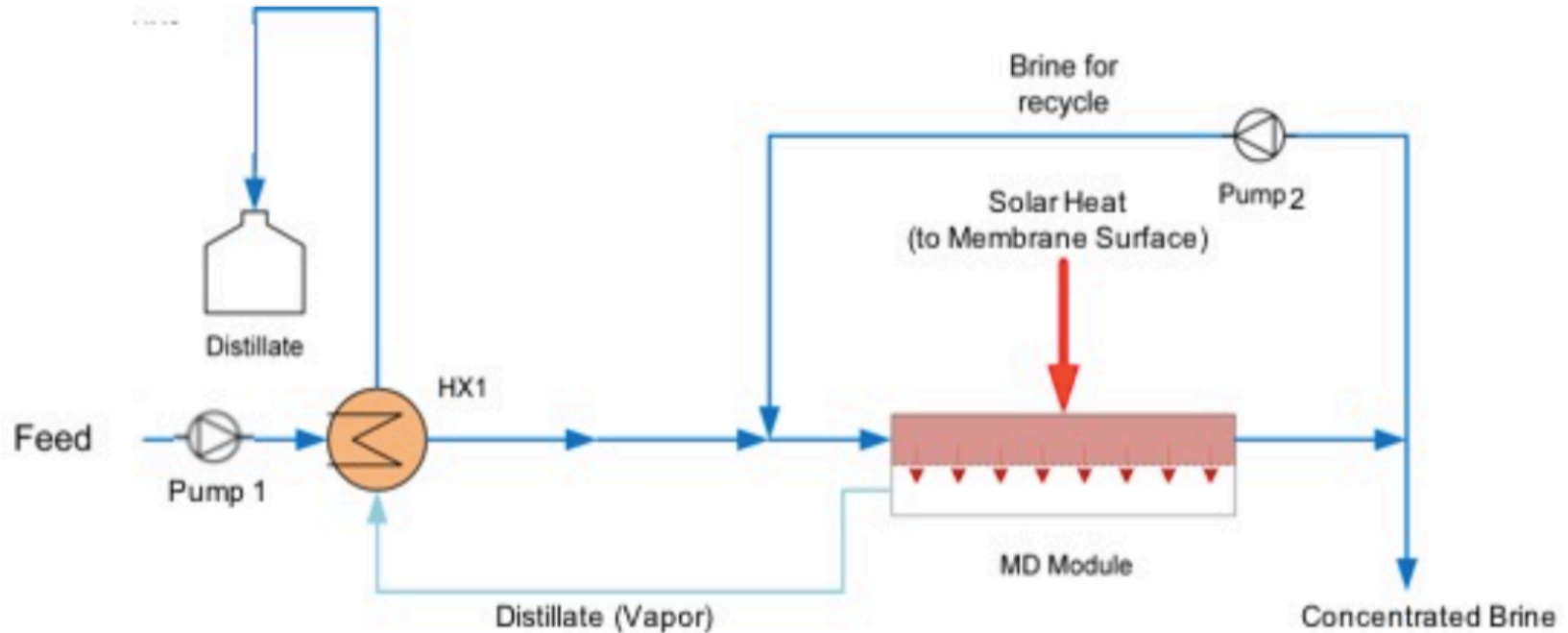
Specific objectives

- Fabricate and characterize thermally and electrically conducting MD membrane materials
- Bench scale testing of thermally and electrically conducting MD membranes for the treatment of high salinity brines
- Model heat and fluid transport in surface-heated MD system
- Manufacture of larger-scale surface-heated MD membranes and modules
- Design, build, and deploy larger-scale MD system for oil and gas wastewater treatment
- Conduct techno-economic analysis of surface-heated MD process

Thermally conducting membrane



Vacuum membrane distillation



Deliverables and impact

- Transformative thermally and electrically conducting membranes capable of delivering heat and electrical charge to the membrane/water interface
- An understanding of the material and process requirements needed to enable the effective coupling of solar heat to the MD desalination process
- A demonstration of the technology for the treatment oil and gas wastewater (O&GWW), at a larger scale
- A techno-economic analysis of the desalination process
- A cost-effective desalination process ($\$1.5/\text{m}^3$) capable of treating high-salinity brines ($>100\text{g/L TDS}$)

Thank you!

Questions?

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