

Intensified Membrane Distillation Crystallization-Nanofiltration (iMDC-NF) for Direct Lithium Extraction

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[Link to your 90-second video](#)

Project Summary

TechDesal from Texas Tech proposes to design, establish, and demonstrate the performance of an intensified membrane distillation crystallization-nanofiltration (iMDC-NF) approach for direct lithium extraction (DLE) from geothermal brine. Geothermal brine will be sent to the iMD to dewater the brine and increase the concentration of abundant minerals (Na⁺, Ca²⁺, K⁺, etc.). Pure water will be produced from the permeate side of the iMD unit while an array of abundant minerals will precipitate in the crystallizer. The brine will be then directed to an NF extraction unit to separate lithium from other interfering electrolytes (Mg²⁺) using a highly size-tuned, positively charged NF membrane.

Project Impact

With iMDC-NF: **i)** energy efficient lithium extraction; **ii)** self-sustainable using waste heat from geothermal brine; **iii)** modularized and small footprint, and **iv)** recovering high-quality water and minerals

Key Personnel/Organizations

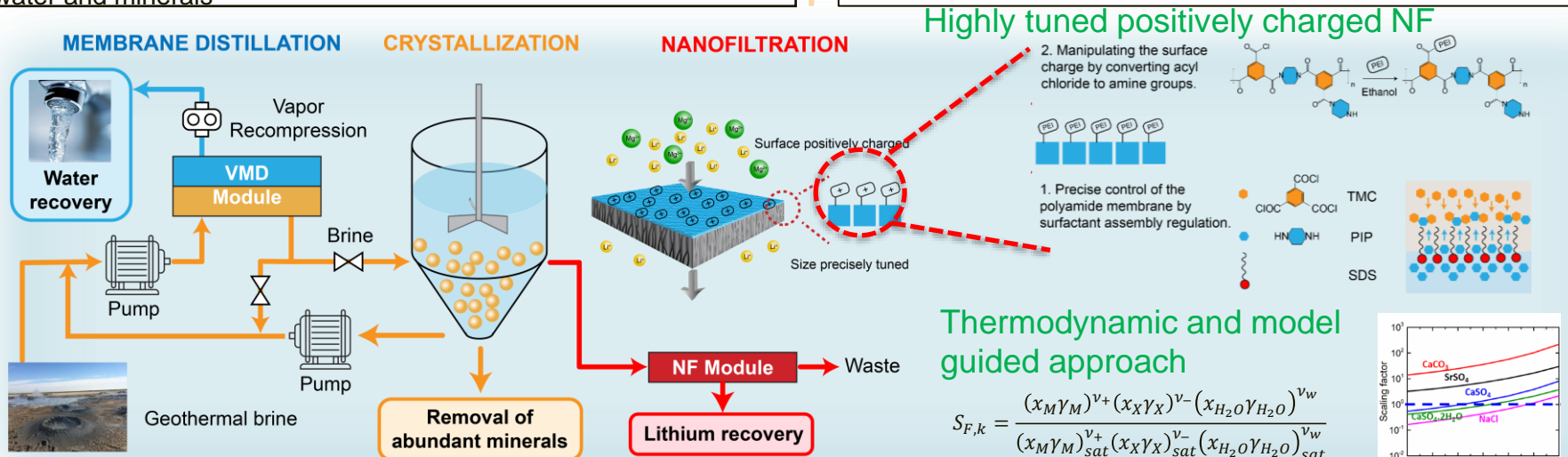
Chemical Engineering, TTU: Mahdi Malmali (C), Chau-Chyun Chen

Civil, Environmental, and Construction Engineering: Yuexiao Shen, Amrika Deonarine

Black & Veatch: Andrew Shaw, Associate Vice President

Key Deliverables

- Design and demonstrate iMDC-NF for geothermal brine DLE
- NF membrane design and performance
- Report performance metrics (Li concentration, throughput, energy consumption, water recovery, etc.)
- Deliver process simulation, thermodynamic models, and LCA/TEA



Intensifying membrane-based separations to reduce water and energy consumption for DLE.