CURRICULUM VITAE

ZACHARY BINGER

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EDUCATION

University of Arizona, Chemical & Environmental Engineering — Tucson, AZ

- Ph.D. Chemical Engineering — Expected Dec 2021
  - Environmental Engineering Concentration
- M.S. Chemical Engineering 2019

The University of New Mexico, Chemical & Biological Engineering — Albuquerque, NM

- B.S. Chemical Engineering 2017
  - Environmental Engineering Concentration

Professional & Research Experience

Graduate Research Assistant- University of Arizona

- Research is currently focused on desalination using reverse osmosis (RO) as well as osmotically driven membrane processes (ODMPs), such as forward osmosis (FO) and pressure retarded osmosis (PRO) for power generation and energy recovery.
- Created models using numerical techniques and computational fluid dynamics (CFD) libraries to perform both module and system-scale investigations of pressure loss, water flux, convection-diffusion phenomena specific to spiral-wound membranes.
- Performed system-level analysis of reverse osmosis system integration with ODMPs to minimizing exergy and maximize energy efficiency while simultaneously reducing the environmental impact of seawater desalination.
- Experimental work focuses on the deformation of membranes and support spacers resulting from applied pressure in membrane modules and the impact on performance.

Undergraduate R&D Intern- Sandia National Labs

- Maintained and tracked quality engineering standards for the development & manufacture of multiple parts critical to maintaining the nuclear weapon stockpile.
- Traveled on-site to collaborate with manufacturers to draft and implement build instructions for the production of components.
- Learned new software that improved the workflow of core quality engineering tasks then held training for the quality engineering teams.

Technology Transfer Intern- STC.UNM

- Learned, analyzed, and translated over 100+ technologies from the University of New Mexico, Los Alamos National Labs, and Sandia National Labs to produce non-confidential summaries, perform novelty searches, conduct industry research to discover companies of potential licensing interest, and create targeted mailings.
- Worked with local start-ups to analyze the strengths and weaknesses of their product compared to competing brands and presented findings in a professional setting.

Technical Skills

Matlab: 7+ years of experience using Matlab to solve numerous engineering problems including fluid flows, systems modeling, data analysis, heat transfer, PID controller tuning, etc.

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C++: 3+ years of experience using open source libraries to create computational fluid dynamics tools for the modeling of membrane processes.
Python: 3+ years of experience using Python for data science, analysis, and visualization. Experience with libraries such as SciPy, NumPy, Pandas, TensorFlow, Matplotlib, seaborn, bokeh.
OpenFOAM: 3+ years of experience using for modeling membrane processes and predicting water flux across semi-permeable membranes.
ANSYS FLUENT: 3+ years of experience for modeling the pressure losses in spacer filled channels for innovation of turbulence promoters in membrane processes.
Aspen Plus: 3 semesters using Aspen Plus to model chemical processes and evaluate their performance.

Leadership Experience and Organization Participation

Future Water Professionals of Arizona- Vice President/Co-Founder, 2018
Hispanic Engineering & Science Organization (HESO)- Treasurer, 2017
American Institute of Chemical Engineers (AIChE)- Member Since 2014

Honors and Awards

Bridge to Doctorate Fellowship, National Science Foundation (NSF)	2018-2020
David LaMonica Award, North American Membrane Society (NAMS)	2018
1st Place 2018 Grand Challenge, Arizona Student Energy Conference	2018
1st Place Poster Contest, AZ Water	2019

Publications

Wei, Xin, Zachary M. Binger, Andrea Achilli, Kelly T. Sanders, and Amy E. Childress. “A modeling framework to evaluate blending of seawater and treated wastewater streams for synergistic desalination and potable reuse " *Water Research* 170 (2020): 115282.

Zachary M. Binger, Andrea Achilli. “Forward Osmosis and Pressure Retarded Osmosis Process Modeling for Integration with Seawater Reverse Osmosis Desalination” *Desalination*

Presentations

“A Simplified Modeling Framework to Investigate Osmotically Driven Processes at the System-scale” North American Membrane Society Annual Conference, Speaker, Phoenix, AZ, May 2020

“Computational Fluid Dynamics Modeling for the Investigation of Multi-layer Spacers” North American Membrane Society Annual Conference, Speaker, Pittsburgh, PA, May 2019

“Investigation of Osmotic Processes for Improving Desalination Efficiency” Arizona Water Association Annual Conference, Poster Presentation, Phoenix, AZ, Jan 2019

“System-level Modeling of Osmotic Process Integration with Seawater Reverse Osmosis” Arizona Student Energy Conference, Poster Presentation, Tucson, AZ, Nov 2019

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"Implementation and Modeling of Osmotic Processes for Improving Desalination Efficiency" National Science Foundation LSAMP-BD Conference, Poster Presentation, Washington D.C., Feb 2019

"Investigation of Water Flux and Pressure Losses in Osmotically Driven Membrane Systems Using Computational Fluid Dynamics Modeling" North American Membrane Society Annual Conference, Poster Presentation, Lexington, KY, May 2018