RUOYU WANG

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CURRENT POSITION

Postdoctoral Associate at Yale University — Starting from Oct. 15th 2023

EDUCATION

Vanderbilt University — Nashville, TN
Ph.D. in Environmental Engineering — May 2023

Carnegie Mellon University. — Pittsburgh, PA
M.S. in Civil and Environmental Engineering — Dec 2018

Shanghai Jiao Tong University — Shanghai, China
B.E. in Environmental Science and Engineering — July 2017

Ph.D. DISSERTATION TITLE

Membrane-based Ion-ion Separation Processes: Nanofiltration and Electrodialysis

RESEARCH EXPERIENCE

Postdoctoral Researcher (Supervisor: Dr. Shihong Lin) — 2023.5-2023.10
Civil and Environmental Engineering, Vanderbilt University

Graduate Research Assistant (Supervisor: Dr. Shihong Lin) — 2019.1-2023.5
Civil and Environmental Engineering, Vanderbilt University

- Evaluated and compared the performance of nanofiltration and electrodialysis for Li^+/Mg^{2+} separation.
- Extended an ion partition and transport model for mixed salts in ion exchange membranes under electrodialysis.
- Proposed and validated multi-pass nanofiltration process for high lithium recovery and product purity.
- Proposed a new framework for performance evaluation of nanofiltration-based Li^+/Mg^{2+} separation.
- Illustrated the cross-method incomparability of solute-solute selectivity.
- Analyzed the thermodynamics and energy efficiency of zero liquid discharge processes.
- Modeled the bipolar membrane electrodialysis process for ammonia recovery from synthetic source-separated urine.
- Analyzed the thermodynamics of intercalation capacitive deionization.

Graduate Summer Research (Supervisor: Dr. Meagan Mauter) — 2017-2018
Civil and Environmental Engineering, Carnegie Mellon University

- Participated in the proposal of corrections to Nusselt correlations in membrane distillation process to reduce uncertainty of permeability performance evaluation.

Undergraduate Research Assistant — 2014-2017
Environmental Science and Engineering, Shanghai Jiao Tong University

- Characterized adsorption behavior and mechanism of graphene material by static batch tests and modeling.
- Isolated PAHs degrading bacteria from petroleum-contaminated soil and optimized the degradation conditions.

TEACHING AND MENTORING EXPERIENCE

Guest Lecturer, ENVE 4625/5625 Environmental Separation Processes — Spring 2022 & 2023
Civil and Environmental Engineering, Vanderbilt University

Teaching Assistant, CE 3700L-01 Fluid Mechanics Lab — Fall 2019
Civil and Environmental Engineering, Vanderbilt University

Teaching Assistant, CE 3100W-01 Civil Environmental Engineering Lab — Spring 2019
Civil and Environmental Engineering, Vanderbilt University

PUBLICATIONS (Peer-Reviewed Journal Publications)

First Author & Co-first Author:

- **Wang, R.**, Alghanayem, R., & Lin, S. (2023). Multi-pass Nanofiltration for Lithium Separation with High Selectivity and Recovery. *Environmental Science & Technology*.
- **Wang, R.**, Duddu, R., & Lin, S. (2023). Extended Donnan-Manning theory for selective ion partition and transport in ion exchange membrane. *Journal of Membrane Science*, 121782.
- **Wang, R.**, He, R., He, T., Elimelech, M., & Lin, S. (2023). Performance Metrics for Nanofiltration-based Selective Separation for Resource Extraction and Recovery. *Nature Water*, 1-10.
- Lopez, K.[1], **Wang, R.[1]**, Hjelvik, E., Lin, S., & Straub, A. (2022). Toward a Universal Framework for Evaluating Transport Resistances and Driving Forces in Membrane-Based Desalination Processes. *Science Advances*, *9*(1), eade0413. ([1] equal contributions)
- **Wang, R.**, & Lin, S. (2022). Thermodynamics and Energy Efficiency of Zero Liquid Discharge. *ACS ES&T Engineering*, *2*(8), 1491-1503.
- **Wang, R.[1]**, Zhang, J.[1], Tang, C. Y., & Lin, S. (2022). Understanding Selectivity in Solute–Solute Separation: Definitions, Measurements, and Comparability. *Environmental Science & Technology*, *56*(4), 2605-2616. ([1] equal contributions)
- Li, Y. [1], **Wang, R. [1]**, Shi, S., Cao, H., Yip, N. Y., & Lin, S. (2021). Bipolar membrane electrodialysis for ammonia recovery from synthetic urine: experiments, modeling, and performance analysis. *Environmental Science & Technology*, *55*(21), 14886-14896. ([1] equal contributions)
- **Wang, R.**, & Lin, S. (2021). Pore model for nanofiltration: History, theoretical framework, key predictions, limitations, and prospects. *Journal of Membrane Science*, *620*, 118809.
- **Wang, R.**, & Lin, S. (2020). Thermodynamic reversible cycles of electrochemical desalination with intercalation materials in symmetric and asymmetric configurations. *Journal of colloid and interface science*, *574*, 152-161.

Others:

- Zhang, X., Yao, Y., Horseman, T., **Wang, R.**, Yin, Y., Zhang, S., Tong, T. and Lin, S. (2023). Electrodialytic crystallization to enable zero liquid discharge. *Nature Water*, pp.1-8.
- Mi, J., Wu, X., Capper, J., Li, X., Shalaby, A., **Wang, R.**, Lin, S., Hajj, M., & Zuo, L. (2023). Experimental investigation of a reverse osmosis desalination system directly powered by wave energy. *Applied Energy*, 343, 121194.
- Zhu, Y., Gui, L., **Wang, R.**, Wang, Y., Fang, W., Lin, S., & Jin, J. (2023). Regulation of molecular transport in polymer membranes with voltage-controlled pore size at the angstrom scale. *Nature Communication*, 14(1) 2373.
- Jeong, N., Epsztein, R., **Wang, R.**, Park, S., Lin, S., & Tong, T. (2023). Exploring the Knowledge Attained by Machine Learning on Ion Transport across Polyamide Membranes Using Explainable Artificial Intelligence. *Environmental Science & Technology*.
- Liu, W., **Wang, R.**, Straub, A., & Lin, S. (2023). Membrane Design Criteria and Practical Viability of Pressure-driven Distillation. *Environmental Science & Technology*, *57*(5), 2129-2137.
- He, R., Xu, S., **Wang, R.**, Bai, B., Lin, S., & He, T. (2022). Polyelectrolyte-based nanofiltration membranes with exceptional performance in Mg^{2+}/Li^{+} separation in a wide range of solution conditions. *Journal of Membrane Science*, *663*, 121027.
- Dudchenko, A. V., Hardikar, M., Anand, A., Xin, R., **Wang, R.**, Gopu, C., & Mauter, M. S. (2022). Guidance on Nusselt Number Correlation Selection in Membrane Distillation. *ACS ES&T Engineering*, *2*(8), 1425-1434.
- Christie, K. S., Horseman, T., **Wang, R.**, Su, C., Tong, T., & Lin, S. (2022). Gypsum scaling in membrane distillation: Impacts of temperature and vapor flux. *Desalination*, *525*, 115499.
- Lu, Y., **Wang, R.**, Zhu, Y., Wang, Z., Fang, W., Lin, S., & Jin, J. (2021). Two-dimensional fractal nanocrystals templating for substantial performance enhancement of polyamide nanofiltration membrane. *Proceedings of the National Academy of Sciences*, *118*(37), e2019891118.

- Dudchenko, A. V., Hardikar, M., Xin, R., Joshi, S., **Wang, R.**, Sharma, N., & Mauter, M. S. (2020). Impact of module design on heat transfer in membrane distillation. *Journal of Membrane Science*, *601*, 117898.
- Zhao, P., Yu, F., **Wang, R.**, Ma, Y., & Wu, Y. (2018). Sodium alginate/graphene oxide hydrogel beads as permeable reactive barrier material for the remediation of ciprofloxacin-contaminated groundwater. *Chemosphere*, *200*, 612-620.

PRESENTATIONS

Oral Presentations

- Comparison of Nanofiltration and Electrodialysis for Lithium Magnesium Separation with a Unified Mass Transport Model. *2023 Association of Environmental Engineering and Science Professors Conference*.
- Lithium/Magnesium Selectivity in Membrane Separation: Definition, Measurement, and Process Scale Evaluation. *2022 International Conference on Resource Sustainability*.
- Solute-solute Selectivity in Membrane Separation: Definition, Measurement, and Process Scale Evaluation. *2022 North American Membrane Society Conference*.
- Vapor Flux of Membrane Distillation: Theoretical Limits, Insights on Membrane Design, and Anomalous Phenomena. *2022 North American Membrane Society Conference*.

Poster Presentations

- Solute-solute Selectivity in Membrane Separation: Definition, Measurement, and Process Scale Evaluation. *2022 Association of Environmental Engineering and Science Professors Conference*.
- Solute-solute Selectivity in Membrane Separation: Definition, Measurement, and Process Scale Evaluation. *2022 North American Membrane Society Conference*.
- Thermo-osmosis in Polyamide Membranes. *2021 North American Membrane Society Conference*.

HONORS AND AWARDS

CAPEES-Elsevier Outstanding Graduate Award	2023
ACS Environmental Chemistry Graduate Student Award	2023
AEESP Conference Travel grant	2022
Vanderbilt Graduate School Travel grant	2021
Vanderbilt Carl E. Adams Graduate Award	2019-2020
Carnegie Mellon University Civil and Environmental Engineering Department Scholarship	2017-2018
Shanghai Jiao Tong University Outstanding Graduates	2017
Singapore Technology Engineering Scholarship	2014-2016

SERVICE

- Reviewer of research journals: Environmental Science & Technology, Environmental Science & Technology Letters, Chemical Engineering Journal Advances, Journal of Water Process Engineering, and Resources, Conservation & Recycling.
- Social media editor of research journals: Chemical Engineering Journal Advances, and Journal of Water Process Engineering.
- Officer of Chinese-American Professors in Environmental Engineering and Science Student Chapter.

PROFESSIONAL MEMBERSHIPS

- American Chemical Society, 2023
- Association of Environmental Engineering and Science Professors, 2022-2023
- Chinese-American Professors in Environmental Engineering and Science, 2021-2023
- North American Membrane Society, 2020-2023