Allyson L. McGaughey
Distinguished Postdoctoral Fellow
Andlinger Center for Energy and the Environment
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Education

- **PhD, Environmental Engineering (January 2021)**
  University of Southern California, Los Angeles, CA, USA
  Dissertation: *The Roles of Surface and Pore Properties in Wetting Resistance for Membrane Distillation Membranes* (Advisor: Prof. Amy Childress)
- **MS, Environmental Engineering (May 2017)**
  University of Southern California, Los Angeles, CA, USA
- **BS, Chemical Engineering with a Minor in Music (August 2014)**
  University of Washington, Seattle, WA, USA

Appointments

- **Distinguished Postdoctoral Fellow at Andlinger Center for Energy and the Environment, Princeton University, June 2021-present**
  - Fabricating and characterizing polymer materials to advance performance and energy efficiency of water treatment and resource recovery processes, developing separation processes for resource recovery from biological processes, and applying data science for material design in resource recovery processes
  - Assisting in supervision of PhD students and undergraduate researchers through NSF REU program
- **Postdoctoral Associate at University of Southern California, February-June 2021**
  - Performed research studies on the characterization of surface and internal properties of hydrophobic membranes and the characterization and integration of waste heat sources into membrane separation systems
  - Assisted in supervision of PhD students and preparation of reports and peer-reviewed publications
- **Graduate Research Assistant at University of Southern California, August 2015-February 2021**
  - Performed research studies on long-term performance of membrane distillation for moderate and high-salinity streams; investigated role of membrane properties in wetting of hydrophobic membranes exposed to scaling and surfactants
  - In collaboration with other lab members, research groups, and industry partners, studied membrane fouling in processes for energy production from wastewater streams and direct potable reuse, mechanical deformation of membranes used in membrane distillation, and integration of low-grade heat into membrane distillation
  - Key contributor to NSF Process Separations grant proposal, awarded for $460,000 (June 2018)
  - Co-contributor to US Bureau of Reclamation's "More Water, Less Concentrate" competition proposal, awarded for $10,000 (May 2018)
- **Teaching Assistant at University of Southern California, August 2015-February 2021**
  Courses: Energy and the Environment (ENE 505), Aquatic Chemistry (ENE 562), Climate Change and Atmospheric Aerosols (ENE 527), Civil & Environmental Engineering Research Colloquium (CE 599), Water Supply and Sewerage Design (CE 465), Water Quality Control (CE 453), Fundamentals of Environmental Engineering (ENE 200)
  - Developed and led laboratory sessions
  - Developed and delivered course lectures when professors were unavailable
  - Held office hours, proctored exams, and graded exams and homework assignments

Publications

Submitted and In Preparation

1. X. Xu, Y.L. Eatmon, K.S.S. Christie, **A.L. McGaughey**, N. Guillomaitre, Z.J. Ren, S.S. Datta, C.B. Arnold, R.D. Priestley. "Phase separation induced supramolecular gel with mechanically strong, highly stable, and recyclable properties." Under review.
2. K.S.S. Christie, **A.L. McGaughey**, S. McBride, X. Xu, R.D. Priestley, Z.J. Ren. "Membrane Distillation Crystallization for Sustainable Carbon Utilization and Storage." Under review.
3. S. Joshi, **A.L. McGaughey**, A.E. Childress. "From surface wetting to internal wetting: how salinity, pressure, and fouling impact air gap thickness during membrane distillation." In preparation.

Published

1. **A.L. McGaughey**, S. Srinivasan, T. Zhao, K.S.S. Christie, Z.J. Ren, R.D. Priestley. "Scalable zwitterionic polymer brushes for antifouling membranes via Cu^0-mediated atom transfer radical polymerization." *ACS Applied Polymer Materials* (2023).
2. M. Yang, J.J. Zhu, **A.L. McGaughey**, S. Zheng, R.D. Priestley, Z.J. Ren. "Predicting Extraction Selectivity of Acetic Acid in Pervaporation by Machine Learning Models with Data Leakage Management." *Environmental Science & Technology* 57 (2023).
3. **A.L. McGaughey**, A.E. Childress. "Wetting indicators, modes, and trade-offs in membrane distillation." *Journal of Membrane Science* 642 (2022).
4. A. Xin, K. Yu, R. Zhang, B. Ruan, **A.L. McGaughey**, Z. Feng, K.H. Lee, Kyung Y. Chen, A. Childress, Q. Wang, "Bone-Inspired Healing of 3D-Printed Ceramics." *Materials Horizons* 7 (2020): 2130-2140.
5. **A.L. McGaughey**, P. Karandikar, M. Gupta, A.E. Childress. "Hydrophobicity versus Pore Size: Polymer Coatings to Improve Membrane Wetting Resistance for Membrane Distillation." *ACS Applied Polymer Materials* 2.3 (2020): 1256-1267
6. R.D. Gustafson, **A.L. McGaughey**, W. Ding, S.C. McVety, A.E. Childress. "Morphological Changes and Creep Recovery Behavior of Expanded Polytetrafluoroethylene (ePTFE) Membranes used for Membrane Distillation." *Journal of Membrane Science* 584 (2019): 236-245.
7. C.P. Morrow, **A.L. McGaughey**, S.R. Hiibel, A.E. Childress. "Submerged or Sidestream? The Influence of Module Configuration on Fouling and Salinity in Osmotic Membrane Bioreactors." *Journal of Membrane Science* 548 (2018): 583-592.
8. **A.L. McGaughey**, R.D. Gustafson, A.E. Childress. "Effect of long-term operation on membrane surface characteristics and performance in membrane distillation." *Journal of Membrane Science* 543 (2017): 143-150.

Conference Presentations and Papers

1. **A.L. McGaughey***, S. Srinivasan, K.S.S. Christie, Z.J. Ren, R.D. Priestley, "Zwitterionic polymer brush membranes at ambient conditions: examining the roles of brush thickness and density," *10th International Water Association Membrane Technology Conference*. July 23 2023. St. Louis, Missouri, USA. (oral presentation)
2. **A.L. McGaughey***, S. Srinivasan, Z.J. Ren, R.D. Priestley, "Scaling up polymer brush membranes: relating brush properties to performance," *AEESP Research and Education Conference*. June 21 2023. Boston, Massachusetts, USA. (oral presentation)
3. S.G. Joshi*, **A.L. McGaughey**, A.E. Childress, "Characterizing liquid intrusion during membrane distillation: impacts of membrane properties, salinity, pressure, and fouling," *NAMS 2023 Annual meeting*. May 15, 2023. Tuscaloosa, Alabama, USA. (poster presentation; 2nd place Student Poster Award)
4. S.G. Joshi*, **A.L. McGaughey**, A.E. Childress, "Wetting resistance to enhance competitiveness of membrane distillation," *3rd International Workshop on Membrane Distillation and Innovating*

Membrane Operations in Desalination and Water Reuse. April 25, 2023. Sorrento, Italy. (oral presentation)

5. **A.L. McGaughey***, S. Srinivasan, K.S.S. Christie, Z.J. Ren, R.D. Priestley, "Scaling up polymer brush membranes for water and resource recovery," *Andlinger Center 2022 Annual Meeting*. October 14 2022. Princeton, New Jersey, USA. (poster presentation)
6. **A.L. McGaughey***, S. Srinivasan, K.S.S. Christie, Z.J. Ren, R.D. Priestley, "Scalable zwitterionic polymer brushes for broad fouling resistance," *AEESP Research and Education Conference*. June 29 2022. St. Louis, Missouri, USA. (oral presentation)
7. **A.L. McGaughey***, S. Srinivasan, K.S.S. Christie, Z.J. Ren, R.D. Priestley, "Scalable polymer brushes for antifouling membranes," *NAMS 31st Annual Meeting*. May 18 2022. Tempe, Arizona, USA. (oral presentation)
8. **A.L. McGaughey***, S.G. Joshi, A.E. Childress. "Modes and metrics of wetting in membrane distillation." *5th International Conference on Desalination using Membrane Technology*. November 15 2021. Online: live and on-demand. (keynote presentation)
9. **A.L. McGaughey***, S.G. Joshi, A.E. Childress. "Wetting in membrane distillation: modes, mechanisms, and metrics." *NAMS 30th Annual Meeting*. August 30 2021. Estes Park, Colorado, USA. (oral presentation)
10. **A.L. McGaughey***, P. Karandikar, M. Gupta, A.E. Childress. "High-salinity membrane distillation: Impact of material properties on membrane performance." *ACS Spring 2020 National Meeting & Expo*. April 30 2020. Philadelphia, Pennsylvania, USA. (slides published; oral presentation cancelled due to COVID19)
11. A.E. Childress*, **A.L. McGaughey,** R.D. Gustafson. "Wetting in membrane distillation: The roles of surface and internal hydrophobicity." *4th International Conference on Desalination Using Membrane Technology*. December 3 2019. Perth, Australia. (oral presentation)
12. **A.L. McGaughey***, P. Karandikar, M. Gupta, A.E. Childress. "Understanding wetting of hydrophobic materials for membrane distillation applications." *AEESP Research and Education Conference*. May 15 2019. Tempe, Arizona, USA. (poster presentation)
13. **A.L. McGaughey***, P. Karandikar, M. Gupta, A.E. Childress. "Impact of membrane properties on wetting in membrane distillation." *NAMS 28th Annual Meeting*. May 13 2019. Pittsburgh, Pennsylvania, USA. (oral presentation)
14. **A.L. McGaughey***, P. Karandikar, R.D. Gustafson, M. Gupta, A.E. Childress. "Understanding Wetting and Rejection in Membrane Distillation: Towards Long-Term, High Recovery Treatment of High-Salinity Streams." *2019 Membrane Technology Conference and Exposition*. February 27 2019. New Orleans, Louisiana, USA. (oral presentation and conference paper)
15. **A.L. McGaughey***, R.D. Gustafson, A.E. Childress. "Examining the role of internal and distillate-side membrane hydrophobicity on wetting and rejection in membrane distillation." *NAMS 27th Annual Meeting.* June 11 2018. Lexington, Kentucky, USA. (poster presentation)

Invited Talks

1. **A.L. McGaughey***, S. Srinivasan, K.S.S. Christie, Z.J. Ren, R.D. Priestley. "Scalable polymer brushes: new materials for water and resource recovery." New Light: Rising Stars in Energy and the Environment, Andlinger Center 2022 Summer Seminar Series, Princeton University. July 20 2022.
2. **A.L. McGaughey***, "Membrane Distillation for Challenging Wastewaters: Understanding Wetting Resistance." WiSE STEM Bytes Seminar, USC. October 6 2020.
3. **A.L. McGaughey***, P. Karandikar, R.D. Gustafson, M. Gupta, A.E. Childress. "Membrane Processes for Wastewater Reuse and Desalination." Civil & Environmental Engineering Colloquium, USC. March 26 2020.
4. **A.L. McGaughey***, A.E. Childress. "Water Sustainability in Coastal Regions: Integrated Systems of Wastewater Reuse and Desalination." Crespi Carmelite High School STEMinar. Los Angeles, California, USA. May 11 2017.

5. **A.L. McGaughey***, R.D. Gustafson, A.E. Childress. “Impact of Long-Term Operation on Membrane Hydrophobicity and Surface Morphology in Membrane Distillation.” Civil & Environmental Engineering Departmental Seminar, USC. April 7 2017.

** presenting author*

Service and Leadership

- **Reviewer for *Energy and Environmental Science; Environmental Science & Technology Letters; Desalination*; *Resource, Recovery, & Recycling*; and *Environmental Science: Water Research & Technology*, January 2017-present**
- **Princeton Keller Center Program in Institutional and Historical Racism**
- **NextGen Site Representative for National Alliance for Water Innovation (NAWI), 2018-2020**
  - Served as graduate student point-of-contact at USC for NAWI consortium, which leads the US Department of Energy Energy-Water Desalination Hub
  - Presented at and participated in NAWI events; supported faculty in responding to NAWI requests
- **Mentor for USC Young Researchers Program (YRP), USC Summer High School Intensive in Next-Generation Engineering (SHINE), USC Women in Science and Engineering (WiSE), and Científico Latino GSMI program, June 2017-June 2020**
  - Mentored three local high school students from traditionally underrepresented populations through USC YRP and three high school students through USC SHINE as they developed and carried out original research projects during summer programs on campus, culminating in formal poster sessions
  - Mentored senior undergraduate student in environmental studies and science visualization through USC WiSE program
  - Mentored prospective graduate student applying to Ph.D. programs through Científico Latino GSMI program
- **PADI Divemaster and Rescue Diver, June 2012-July 2015**
  - As a certified Divemaster, assisted dive instructors in training new SCUBA divers, guided students during open-water drives, and assisted in administering skill tests
  - As a certified Rescue Diver, trained to manage diver emergency scenarios, including search-and-rescue and basic emergency medical response
  - Developed excellent teaching and communication skills while working with PADI instructors and dive students
- **Cellist in University of Washington Symphony, August 2011-May 2014**
  - Performed with symphony and chamber orchestra (6-7 concerts per year) with regular and guest conductors, soloists, choral groups, and dancers
  - Attended weekly and daily orchestral, group, and solo practices and lessons

Honors and Awards

- Andlinger Center Distinguished Postdoctoral Fellowship (2021)
- USC Viterbi School of Engineering Jenny Wang Excellence in Teaching Award (2021)
- USC CEE Best Dissertation Award (2021)
- USC CEE Outstanding Teaching Assistant Award (2020)
- USC Women in Science and Engineering (WiSE) Merit Award (2019)
- USC CEE Outstanding Research Assistant Award (2018)
- American Membrane Technology Association/Affordable Desalination Coalition Fellowship (2019)
- USC Viterbi School of Engineering Ph.D. Merit Fellowship (2015-2018)
- USC Dean’s 4.0 List (2017)
- University of Washington Dean’s List (2011-2014)

Skills and Certifications

- **Instrumentation and laboratory skills**:
  - Experienced in instrumentation including scanning electron microscope and energy-dispersive X-ray spectroscope (FESEM-EDS) (JEOL JSM-7001F, FEI Nova NanoSEM 450, FEI Quanta 200 ESEM), atomic force microscope (AFM) (Asylum MFP-3D, Bruker Dimension Icon, Bruker Innova), X-ray photoelectron spectrometer (ThermoFisher K-Alpha), ellipsometer (Woollam M-2000), goniometer (ramé-hart Model 250, Kruss DSA100), and force tensiometer (Kruss K100C)
  - Experienced in polymer synthesis via atom transfer radical polymerization and in design and fabrication of bench-scale systems and data acquisition programs for membrane performance characterization and liquid entry pressure analysis
- **Software:**
  - Experienced in MATLAB, NI LabView, Visual Minteq, OLI Studio, ImageJ, Gwyddion, Veusz, Aspen
- **US NCEES Engineer-in-Training Certification, July 2014**