

Kofi S.S. Christie, Ph.D.

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Appointments

- 2022-** **Assistant Professor**
Department of Civil and Environmental Engineering
Louisiana State University
- 2020-2022** **Presidential Postdoctoral Research Fellow**
Andlinger Center for Energy and the Environment, Department of Civil and Environmental Engineering, and Department of Chemical and Biological Engineering
Princeton University
Topic: Investigation of membrane-assisted carbonate mineral crystallization for sustainable CO₂ storage
Advisors: Z. Jason Ren and Rodney D. Priestley

Education

- 2014-2020** **Ph.D. in Environmental Engineering**
Vanderbilt University
Dissertation: *Membrane Distillation for Brine Treatment: Energy Efficiency and Mineral Scaling*
Advisor: Shihong Lin
- 2014-2016** **M.S. in Environmental Engineering**
Vanderbilt University
Topic: Effects of fouling on process efficiency in ultrafiltration and capacitive deionization
Advisor: Shihong Lin
- 2011-2014** **B.S. in Physics (cum laude)**
Morehouse College

Peer-Reviewed Publications (*h*-index 9)

(* = corresponding author, ^ = equal contribution)

1. McBride, S.A.* , McGaughey, A., **Christie, K.S.S.**, Song, C., Temprano-Coletto, F., Priestley, R.D., Ren, Z.J., Stone, H.A.* Unrefined Coconut Oil and Triglycerides to Increase Contact Angle for Sustainable Coatings. *ACS Sustainable Chemistry & Engineering*. **2024**, In review.
2. **Christie, K.S.S.***, McGaughey, A., McBride, S.A., Xu, X., Priestley, R.D., Ren, Z.J. Membrane Distillation–Crystallization for Sustainable Carbon Utilization and Storage. *Environ. Sci. Technol.* **2023**, 57 (43), 16628–16640. <https://doi.org/10.1021/acs.est.3c04450>.
3. Xu, X., Eatmon, Y.L., **Christie, K.S.S.**, McGaughey, A.L., Guillomaitre, N., Datta, S.S., Ren, Z.J., Arnold, C., Priestley, R.D.* Tough and Recyclable Phase-Separated Supramolecular Gels via a Dehydration–Hydration Cycle. *JACS Au* **2023**, 3 (10), 2772–2779. <https://doi.org/10.1021/jacsau.3c00326>.
4. McGaughey, A.L., Srinivasan, S., Zhao, T., **Christie, K.S.S.**, Ren, Z.J.* , Priestley, R.D.* Scalable Zwitterionic Polymer Brushes for Antifouling Membranes via Cu0-Mediated Atom Transfer Radical Polymerization. *ACS Appl. Polym. Mater.* **2023**, 5 (7), 4921–4932. <https://doi.org/10.1021/acsapm.3c00407>.

5. Xu, X., Guillomaitre, N., **Christie, K.S.S.**, Bay, R.K., Bizmark, N., Datta, S.S., Ren, Z.J., Priestley, R.D.* Quick-Release Antifouling Hydrogels for Solar-Driven Water Purification. *ACS Cent. Sci.* **2023**, *9* (2), 177–185. <https://doi.org/10.1021/acscentsci.2c01245>.
6. Xu, X.^, Bizmark, N.^, **Christie, K.S.S.**, Datta, S.S., Ren, Z.J., Priestley, R.D.* Thermoresponsive Polymers for Water Treatment and Collection. *Macromolecules* **2022**, *55* (6), 1894–1909. <https://doi.org/10.1021/acs.macromol.1c01502>.
7. **Christie, K.S.S.**, Horseman, T., Wang, R., Su, C., Tong, T., Lin, S.* Gypsum Scaling in Membrane Distillation: Impacts of Temperature and Vapor Flux. *Desalination* **2022**, *525*, 115499. <https://doi.org/10.1016/j.desal.2021.115499>.
8. Tang, M., **Christie, K.S.S.**, Hou, D., Ding, C., Jia, X., Wang, J.* Fabrication of a Novel Underwater-Superoleophobic/Hydrophobic Composite Membrane for Robust Anti-Oil-Fouling Membrane Distillation by the Facile Breath Figures Templating Method. *Journal of Membrane Science* **2021**, *617*, 118666. <https://doi.org/10.1016/j.memsci.2020.118666>.
9. Horseman, T., Yin, Y., **Christie, K.S.S.**, Wang, Z., Tong, T., Lin, S.* Wetting, Scaling, and Fouling in Membrane Distillation: State-of-the-Art Insights on Fundamental Mechanisms and Mitigation Strategies. *ACS EST Eng.* **2021**, *1* (1), 117–140. <https://doi.org/10.1021/acsestengg.0c00025>.
10. **Christie, K.S.S.**, Horseman, T., Lin, S.* Energy Efficiency of Membrane Distillation: Simplified Analysis, Heat Recovery, and the Use of Waste-Heat. *Environment International* **2020**, *138*, 105588. <https://doi.org/10.1016/j.envint.2020.105588>.
11. Hou, D., Christie, K.S.S., Wang, K., Tang, M., Wang, D., Wang, J. Biomimetic Superhydrophobic Membrane for Membrane Distillation with Robust Wetting and Fouling Resistance. *Journal of Membrane Science* **2020**, *599*, 117708. <https://doi.org/10.1016/j.memsci.2019.117708>.
12. **Christie, K.S.S.**^, Yin, Y.^, Lin, S.*^, Tong, T.* Distinct Behaviors between Gypsum and Silica Scaling in Membrane Distillation. *Environ. Sci. Technol.* **2020**, *54* (1), 568–576. <https://doi.org/10.1021/acs.est.9b06023>.
13. Su, C., Horseman, T., Cao, H., **Christie, K.S.S.**, Li, Y., Lin, S.* Robust Superhydrophobic Membrane for Membrane Distillation with Excellent Scaling Resistance. *Environ. Sci. Technol.* **2019**, *53* (20), 11801–11809. <https://doi.org/10.1021/acs.est.9b04362>.
14. Horseman, T., Su, C., **Christie, K.S.S.**, Lin, S.* Highly Effective Scaling Mitigation in Membrane Distillation Using a Superhydrophobic Membrane with Gas Purging. *Environ. Sci. Technol. Lett.* **2019**, *6* (7), 423–429. <https://doi.org/10.1021/acs.estlett.9b00354>.

Presentations

1. **Christie, K.S.S.**, Horseman, T., Wang, R., Su, C., Tong, T., Lin, S., Gypsum scaling in direct contact membrane distillation: elucidating the impacts of temperature and flux (Oral). International Water Association – Membrane Technology Conference (IWA-MTC), July 25, 2023
2. **Christie, K.S.S.** (co-session chair), De Souza Chaves, B., Brant, J.A., Session on High-Salinity Brine Treatment. North American Membrane Society (NAMS) 32nd Annual Meeting, May 14-17, 2023
3. **Christie, K.S.S.**, Sustainable Membrane-Based Carbon Mineralization (Poster). Association of Environmental Engineering & Science Professors (AEESP) Research and Education Conference, June 28, 2022

4. **Christie, K.S.S.**, Horseman, T., Wang, R., Su, C., Tong, T., Lin, S., Gypsum scaling in direct contact membrane distillation: elucidating the impacts of temperature and flux (Poster). North American Membrane Society (NAMS) 31st Annual Meeting, May 14, 2022
5. **Christie, K.S.S.**, Sustainable Membrane-Based Carbon Mineralization (Oral). American Chemical Society Spring 2022 Conference, March 20, 2022
6. **Christie, K.S.S.**, Membrane distillation for high salinity brine management: Scaling and energy efficiency (Oral). Carnegie Mellon University, Department of Civil and Environmental Engineering Seminar, March 16, 2021
7. **Christie, K.S.S.**, Membrane Distillation for Brine Treatment and Resource Recovery (Oral). North Carolina State University, Department of Environmental Science and Engineering Seminar, March 3, 2022
8. **Christie, K.S.S.**, Membrane Distillation for Brine Treatment and Resource Recovery (Oral). California Institute of Technology, Department of Civil, Construction, and Environmental Engineering - Environmental, Water Resources, and Coastal Engineering Seminar, February 4, 2022
9. **Christie, K.S.S.**, Membrane Distillation for Brine Treatment and Resource Recovery (Oral). North Carolina State University, Department of Civil, Construction, and Environmental Engineering - Environmental, Water Resources, and Coastal Engineering Seminar, February 4, 2022
10. **Christie, K.S.S.**, Membrane distillation for high salinity brine management: Scaling and energy efficiency (Oral). Louisiana State University, Department of Civil and Environmental Engineering Seminar, February 3, 2021
11. **Christie, K.S.S.**, Sustainable Membrane-Based Carbon Mineralization (Oral). Princeton University, Department of Civil and Environmental Engineering Brown Bag Seminar, January 14, 2022
12. **Christie, K.S.S.**, Sustainable Membrane-Based Carbon Mineralization (Oral). University of Southern California, Department of Civil and Environmental Engineering Seminar, December 2, 2021
13. **Christie, K.S.S.**, Sustainable Membrane-Based Carbon Mineralization (Poster). Andlinger Center for Energy and the Environment – Annual Meeting, October 27, 2021
14. **Christie, K.S.S.**, Membrane Technology for a Water-Optimized Tomorrow (Oral). DuPont, GOLD Seminar, NOBCCChE Conference, September 17, 2021
15. **Christie, K.S.S.**, Polymer Membranes for High-Salinity Wastewater Treatment (Oral). Dow, BEST Symposium, August 2, 2021
16. **Christie, K.S.S.**, Ren, Z.J., Resource recovery from wastewater using membrane crystallization (Oral). Princeton University, Department of Civil and Environmental Engineering Brown Bag Seminar, March 26, 2021
17. **Christie, K.S.S.**, How to apply for and succeed in grad school (Panelist). Vanderbilt University, [GEM Grad Lab](#), October 17, 2020
18. **Christie, K.S.S.**, Horseman, T., Koutsoulas, Y., C-Salt: Sink or Swim? Final Report (Oral). National Science Foundation Innovation Corps, Winter Cohort, February 24, 2020
19. **Christie, K.S.S.**, Tipping the Scale: High Salinity Water Treatment. Vanderbilt University, Department of Civil and Environmental Engineering 3-Minute Thesis Competition, March 22, 2019

20. **Christie, K.S.S.**, Lin, S., Gypsum Scaling in Membrane Distillation: The Interplay between Flux and Temperature (Poster). North American Membrane Society (NAMS) 27th Annual Meeting, June 9-13, 2018

Grant Activity

- 2023 Next-Generation Permeable Pavement for Enhanced Durability and Functionality**
Submitted to U.S. Dept. of Transportation, Southern Plains Transportation Center: Regional UTC
(Awarded)
\$150,000 (1 year)
- 2023 Electropray-Electrospin Additive Manufacturing of Polymeric Membranes for Water Treatment**
Submitted to National Aeronautics & Space Administration, Louisiana Materials Design Alliance (Not awarded)
\$10,000 (1 year)
- 2023 Global Centers Track 1: Center for Saline water Engineering for Carbon Utilization and Resource Extraction (SECURE)**
Submitted to National Science Foundation (Pending)
\$450,000 (5 years)
- 2023 Photocatalytic Disinfection to Mitigate Greenhouse Gas Emissions in Wastewater**
Submitted to U.S. Department of Energy (Not awarded)
\$400,000 (5 years)
- 2023 Catalytic Composite Ultrafiltration Membrane for Simultaneous Degradation and Separation of Perfluoroalkyl Substances**
Submitted to LA Water Resources Research Institute (Awarded)
\$36,000 (1 year)
- 2022 Investigation of Inorganic Fouling in Membrane-Based Water Purification**
Submitted to LA Board of Regents (Awarded)
\$159,000 (3 years)
- 2022 Fundamental Mechanisms of Organic Matter-Gypsum Interactions in Produced Water**
Submitted to American Chemical Society (Not awarded)
\$110,000 (2 years)

Awards, Fellowships, and Distinctions

- 2023** National Organization for Black Chemists and Chemical Engineers Young Trailblazers Award
2023 LSU National Organization for Black Chemists and Chemical Engineers Faculty Mentor Award
2021 DuPont Growth Opportunities Leading in Diversity Program
2021 Dow Building Engineering & Science Talent Symposium
2020 Princeton Presidential Postdoctoral Research Fellowship
2020 National Science Foundation Innovation Corps Grant
2015 National Science Foundation Graduate Research Fellowship
2014 IBM-Vanderbilt Graduate Student Fellowship
2013 United Negro College Fund Jack H. Skirball Scholarship
2012 Society of Physics Students Quadrennial Conference Poster Award
2011 Morehouse College Full TRB Academic Scholarship

Certificates

2021 Engineer in Training (EIT), New Jersey – Environmental Engineering

Teaching and Mentoring

2022- **Louisiana State University**
Department of Civil and Environmental Engineering
Assistant Professor

Courses:

- Desalination for a Circular Water Economy (CE 7701)
- Environmental Transport Processes (EVEG 3780)
- Special Topics in Environmental Engineering: Membrane Separation Processes (EVEG 4780)
- Fundamentals of Environmental Engineering (EVEG 2000)

LSU Student Research Mentees:

- Azmain Akash (Ph.D. in Civil Engineering, 2028)
- Gbenga Daniels (Ph.D. in Civil Engineering, 2028)
- Moises Osorio Ruiz (B.S. in Environmental Engineering, 2026)
- Aidan O’Neal (B.S. in Environmental Engineering, 2025)
- Gregory Bonvillain (B.S. in Environmental Engineering, 2026)
- Darby Frickey (B.S. in Environmental Engineering, 2025)
- Madison Ford (B.S. in Environmental Engineering, 2025)
- Josie Walters (B.S. in Environmental Engineering, 2023)

Other Student Research Mentees:

- Gavin Lanka (B.S. in Mechanical Engineering – Florida International University, 2026)

2017-2021 **Vanderbilt University**
Programs for Talented Youth
Course Instructor

- Environmental Engineering: Sustainability from the Sun to the Sea (grades 9-12)
- The Water-Energy Nexus: Engineering Solutions (grades 7-9)
- Reading and Writing in Engineering (grades 5-7)

2018-2019 **Vanderbilt University**
2014-2015 Department of Civil and Environmental Engineering
Graduate Teaching Assistant

- Civil Engineering Senior Design (undergraduate)
- Intro to Civil Engineering Lab (undergraduate)

2017 **Austin Peay State University**
Department of Earth and Environmental Sciences
Guest Lecturer

- Physical Geology (GEOL 1040)

2016-2017 **Vanderbilt University**
School for Science and Math at Vanderbilt
Graduate Student Research Mentor
Mentee: Tobias Roberts (grade 11)
Project: Flow-Powered UV Disinfection System

- 2015-2017** **Vanderbilt University**
 Programs for Talented Youth
 Graduate Teaching Assistant
- Nanotechnology and Engineering (grades 9-12)
- 2014** **Morehouse College**
 Department of Physics, Department of Mathematics
 Undergraduate Teaching Assistant
- Nuclear, Materials Science, and Space Science Summer Academy (grades 5-8)

Professional Activities

Peer Reviewer

- *ACS ES&T Engineering*
- *Environmental Science & Technology*
- *Environmental Science & Technology Letters*
- *Environmental Science: Water Research and Technology*
- *Journal of Cleaner Production*
- *JACS Au*
- *Physics Today (AIP)*
- *Resources, Conservation, & Recycling*
- National Science Foundation
- National Academy of Sciences

Affiliations

- Water Environment Federation (WEF)
- Association of Environmental Engineering and Science Professors (AEESP)
- American Chemical Society (ACS)
- National Organization of Black Chemists and Chemical Engineers (NOBCChE)
- North American Membrane Society (NAMS)
- National Society of Black Engineers (NSBE)

Service and Outreach

- 2024** Presenter, Gardere Initiative STEM Program, Surf's Up with Surfactants (K-12 outreach activity)
- 2024** Judge, LSU NSBE Shark Tank Competition
- 2023** Judge, LSU Summer Undergraduate Research Forum
- 2023** Presenter, Caneview Elementary School, Surf's Up with Surfactants (K-12 outreach activity)
- 2023** Judge, LSU Graduate Research Conference
- 2023** Judge, AEESP 2023 Poster Competition
- 2023** Judge, NAMS 2023 Poster Competition
- 2023** Presenter, LSU ENGage, Surf's Up with Surfactants (K-12 outreach activity)
- 2022** Panelist, NAWI Alliance NextGen Early Career Professor Panel Discussion