

Shihong Lin Ph.D.

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A. APPOINTMENT

Assistant Professor, Vanderbilt University, Nashville, TN, Jan 2015—Present

Department of Civil and Environmental Engineering (Primary Appointment)

Department of Chemical and Biomolecular Engineering (Secondary Appointment)

B. EDUCATION AND TRAINING

Post-doctoral Research Associate, Yale University, New Haven, CT

Department of Chemical and Environmental Engineering (2013-2014)

(Advisor: Prof. Menachem Elimelech)

Ph.D. in Environmental Engineering, Duke University, Durham, NC (2012)

(Advisor: Prof. Mark R. Wienser)

M.Sc. in Environmental Engineering, Duke University, Durham, NC (2011)

B.Sc. in Environmental Engineering, Harbin Institute of Technology, Harbin, China (2006)

C. HONORS AND AWARDS

- (Faculty Advisor of awardee Li Wang) Best Poster Award, International Conference on Capacitive Deionization & Electrosorption, Beijing (2019)
- (Faculty Advisor of awardee Li Wang) ACS Environmental Chemistry Graduate Student Award (2019)
- ASCE ExCEEEd Fellowship (2017)
- (Faculty Advisor of awardee Zhangxin Wang) CAPEES Best Student Paper Award (2017)
- (Faculty Advisor of awardee Zhangxin Wang) Carl Adams Best Paper Award (2017)
- (Faculty Advisor of awardee Zhangxin Wang) ACS Environmental Chemistry Graduate Student Award (2016)
- Doctoral New Investigator Award, ACS Petroleum Research Fund (2016)
- National Academy of Engineering Frontier of Engineering Symposium Participant (2016)
- EPA P3 Student Design Award (2016)
- ORAU Ralph E. Powe Junior Faculty Awards (2015)
- ACS Environmental Chemistry Graduate Student Award (2013)

D. SERVICE

Vanderbilt University

Department of Civil and Environmental Engineering

- Oversight and Management Policy Committee (EnvE), 2017-present
- Director of Graduate Recruiting (EnvE), 2016-present
- Class of 2019 undergraduate student advisor
- Activities in support of Undergraduate Open House 2015
- Committee of Hoadley Award Best Student Paper (Civ) 2015
- Committee of Carl E. Adams Award for Best Student paper (EnvE) 2015

External

Editorial Role

- Associate Editor, Journal of Water Process and Engineering, Elsevier, since 2019
- Guest Editor for Special Issue *Advanced functional materials for environmental applications*, Environmental International, Elsevier, 2019

Reviewer for Academic Journals:

Environmental Science & Technology, Environmental Science & Technology Letters, Water Research, Journal of Membrane Science, Desalination, Science Advance, Nature Communication, Energy & Environmental Science, Advanced Materials, Science Advance, ACS Nano, ACS Macro Letters, ACS Sustainable Chemistry & Engineering, ACS Applied Materials and Interfaces, Journal of Materials Chemistry A, Progress in Polymer Science, Applied Energy, AIChE Journal, Carbon, Langmuir, Separation and Purification Technology, Advanced Materials Interfaces, Journal of Colloid and Interface Science, Advance in Colloid and Interface Science, Bioresource and Technology, Journal of Contaminant Hydrology, Environmental Science: Nano, Environmental Science: Water Research & Technology, RSC Advance, Frontier of Environmental Science and Engineering, Reviews in Chemical Engineering, Water Science & Technology, Membrane, International Journal of Heat and Mass Transfer, Journal of Environmental Engineering

Reviewer for Funding Agencies

- National Science Foundation
- American Chemical Society Petroleum Research Foundation
- Research Grant Council of Hong Kong
- Natural Sciences and Engineering Research Council of Canada (NSERC)
- Uniformed Services University Center for Global Health Engagement (DOD)
- Israeli Ministry of Science Technology, and Space
- The German Israeli Foundation for Scientific Research and Development
- NWO Wetsus Partnership Program (Netherlands)
- Luxembourg National Research Fund (FNR)
- Austrian Science Fund (FWF)
- King Abdulaziz City for Science and Technology
- Competitive Research Grants (CRG) program at King Abdullah University of Science and Technology (KAUST)

Session Chairs

- Gordon Research Conference: Materials and Processes, New London, NH, August 12-17, 2018
- Membranes for water treatment: membrane distillation, North American Membrane Society (NAMS) 27th Annual Meeting, Lexington, KY, June 10-13, 2018
- Membranes for water treatment: special synthesis and water remediation, North American Membrane Society (NAMS) 27th Annual Meeting, Lexington, KY, June, 2018
- Advanced Membrane Materials, Gordon Research Conference: Membranes: Materials and Processes, New London, New Hampshire, July 31- August 5, 2016
- Membranes: Water Treatment, 2015 AEESP Research and Education Conference, Yale, New Haven, Connecticut, June 12-16, 2015
- Membranes: Processes, 2015 AEESP Research and Education Conference, Yale, New Haven, Connecticut, June 12-16, 2015

Professional Societies

- American Chemical Society (ACS)
- Association of Environmental Engineering and Science Professors (AEESP)
- American Water Works Association (AWWA)
- International Water Association (IWA)
- North American Membrane Society (NAMS)
- Association of Chinese American Professors in Environmental Engineering and Science

E. RESEARCH

Research Areas

- Water treatment and desalination
- Environmental interfacial processes

Peer Reviewed Journal Articles (H-index: 29, citation: 2898 based on Google Scholar as of September 2019)

1. Wang, Z., Horseman, T., Straub, A.P., Yip, N.Y., Li, D., Elimelech, M.*, and **Lin, S.***, "Pathways and challenges for efficient solar-thermal desalination", *Science Advance*, 5, 2019, eaax0763
2. Zou, S., Smith, E. D., **Lin, S.**, Martin, S. M., & He, Z. (2019). Mitigation of bidirectional solute flux in forward osmosis via membrane surface coating of zwitterion functionalized carbon nanotubes. *Environment international*, 131, 104970.
3. Horseman, T., Su, C., Christie, K., and **Lin, S.***, "Highly Effective Scaling Mitigation in Membrane Distillation using Superhydrophobic Membrane with Gas Purging", *Environmental Science & Technology-Letters*, 6, 2019, p423

4. Zou, S., Smith, E.D., **Lin, S**, Martin, S., and He, Z., "Mitigation of Bidirectional Solute Flux in Forward Osmosis via Membrane Surface Coating of Zwitterion Functionalized Carbon Nanotubes", *Environmental International*, accepted
5. Wang, L., and **Lin, S***, "Theoretical Framework for Designing a Desalination Plant based on Membrane Capacitive Deionization", *Water Research*, 158, 2019, p359
6. Huang, Y.X., Liu, M.J., Chen, S., Jasmi, I., Tang, Y., and **Lin, S***, "Enhanced Adsorption and Slow Release of Phosphate by Dolomite-Alginate Composite Beads as Potential Fertilizer", *Water Environment Research*, 2019,
7. Wang, L., and **Lin, S***, "Mechanism of Selective Ion Removal in Membrane Capacitive Deionization for Water Softening", *Environmental Science & Technology*, 53, 2019, p5797
8. Wang, L., Dykstra, J., and **Lin, S***, "Energy efficiency of capacitive deionization " *Environmental Science & Technology*, 53, 2019, p3366
9. Ji, F., Wang, L., Yang, J., Wu, X., Li, M., Jiang, Si., **Lin, S***, Z Chen* "Highly compact, free-standing porous electrodes from polymer-derived nanoporous carbons for efficient electrochemical capacitive deionization", *Journal of Materials Chemistry A*, 7, 2019, p1768
10. Wang, Z., Chen, Y., Zhang, F., and **Lin, S***, "Significance of surface excess concentration in the kinetics of surfactant-induced pore wetting in membrane distillation" *Desalination*, 450, 2019, p46
11. Wang, Z., Chen, Y., and **Lin, S***, "Kinetic model for surfactant-induced pore wetting in membrane distillation" *Journal of Membrane Science*, 564, 2018, p275
12. Hou, D.*, Lin, D., Wang, Z., Wang, J., and **Lin, S.***, "Composite Membrane with Electrospun Multiscale-textured Surface for Robust Oil-fouling Resistance in Membrane Distillation", *Journal of Membrane Science*, 546, 2018, p179
13. Shan, L., Liang, Y., Prozorovska, L., Jennings, K., Ji, S, and **Lin, S.***, "Multifold Enhancement of Loose-Nanofiltration Membrane Performance by Intercalation of Surfactant Assemblies", *Environmental Science & Technology-Letters*, 5, 2018, p668
14. Wang, L., and **Lin, S***, "Membrane Capacitive Deionization with Constant Current vs. Constant Voltage Charging: Which is Better?" *Environmental Science & Technology*, 52, 2018, p4051
15. Wang, Z., Wang, Z., **Lin, S.**, Jin, H., Gao, S., Zhu, Y.*, and Jin, J.*, "Nanoparticle-templated nanofiltration membranes for ultrahigh performance desalination", *Nature Communications*, 9, 2018, article # 2004
16. Wang, Z., Chen, Y., Sun, X., Duddu, R., and **Lin, S***, "Mechanism of pore wetting in membrane distillation with alcohol vs. surfactant" *Journal of Membrane Science*, 559, 2018, p183
17. Deshmukh, A., Boo, C., Karanikola, V., **Lin, S.**, Straub A., Tong, T., Warsinger, D., and Elimelech, M.*, "Membrane distillation at the water-energy nexus: limits, opportunities, and challenges", *Energy & Environmental Science*, 11, 2018, p1177
18. Wang, L., and **Lin, S.***, "Intrinsic tradeoff between kinetic and energetic efficiencies in membrane capacitive deionization", *Water Research*, 129, 2018, p394

19. Wang, L., Biesheuvel, P.M., and Lin, S.*, "Reversible thermodynamic cycle analysis for capacitive deionization with modified Donnan model", *Journal of Colloid and Interface Science*, 512, 2018, p522
20. Huang, Y.X., Wang, Z., Jin, J., and Lin, S.*, "Novel Janus Membrane for Simultaneous Anti-Wetting and Anti-Fouling Membrane Distillation Desalination", *Environmental Science & Technology*, 51, 2017, p13304
21. Chen, Y.#, Wang, Z.#, Jennings, K., and Lin, S.*, "Probing Pore Wetting in Membrane Distillation using Impedance: Early Detection and Mechanism of Surfactant-induced Wetting", *Environmental Science & Technology-Letters*, 4, 2017, p505
22. Bogler, A., Lin, S., and Bar-Zeev, E.*, "Biofouling of membrane distillation, forward osmosis and pressure retarded osmosis: principles, impacts and future directions", *Journal of Membrane Science*, 542, 2017, p378
23. Huang, Y.X., Wang, Z., Hou, D., and Lin, S.*, "Coaxially Electrospun Super-amphiphobic Silica-based Membrane for Anti-surfactant-wetting Membrane Distillation", *Journal of Membrane Science*, 531, 2017, p122
24. Wang Z., and Lin, S.*, "Membrane Fouling and Wetting in Membrane Distillation and their Mitigation by Novel Membranes with Special Wettability", *Water Research*, 112, 2017, p 38
25. Wang Z., and Lin, S.*, "The Impact of Low-surface-energy Functional Groups on Oil Fouling Resistance in Membrane Distillation", *Journal of Membrane Science*, 527, 2017, p68
26. Lin, S.* and Elimelech, M., "Kinetics and Energetics Trade-off in Reverse Osmosis Desalination with Different Configurations", *Desalination*, 402, 2017, p42
27. Wang, Z., Jin, J., Hou, D., and Lin, S.*, "Tailoring surface charge and wetting property for robust oil-fouling mitigation in membrane distillation", *Journal of Membrane Science*, 516, 2016, pp 113-122
28. Straub, A.P., Yip, N.Y., Lin, S., Lee, J., and Elimelech, M., "Harvesting low-grade heat energy using thermo-osmotic vapor transport through nonporous membranes", *Nature Energy*, 1, 2016, pp 16090
29. Lin, S.*, "Mass Transfer in Forward Osmosis with Hollow Fiber Membranes", *Journal of Membrane Science*, 514, 2016, pp 176-185
30. Wang, Z., Hou, D., and Lin, S.*, "Composite Membrane with Underwater-Oleophobic Surface for Anti-Oil-Fouling Membrane Distillation", *Environmental Science & Technology*, 50, 2016, pp 3866-3874
31. Wang, Z., Elimelech, M., and Lin, S.*, "Environmental Applications of Interfacial Materials with Special Wettability", *Environmental Science & Technology*, 50, 2016, pp 2132-2150
32. Wang, Z., Hou, D., and Lin, S.*, "Gross vs. Net Energy: Towards a Rational Framework for Assessing the Practical Viability of Pressure Retarded Osmosis", *Journal of Membrane Science*, 503, 2016, pp 132-147
33. Lin, S. and Elimelech, M., "Staged Reverse Osmosis Operation: Configuration, Energy Efficiency, and Application Potential", *Desalination*, 366, 2015, pp 9-14.

34. Deshmukh, A., Yip, N.Y., **Lin, S.**, and Elimelech, M. "Desalination by forward osmosis: identifying performance limiting parameters through module-scale modeling", *Journal of Membrane Science*, 491, 2015, Pp 159-167
35. Shauly, E., Boo, C., **Lin, S.**, and Elimelech, M., "Membrane-Based Osmotic Heat Engine with Organic Solvent for Enhanced Power Generation from Low-Grade Heat", *Environmental Science & Technology*, 49, 2015, pp 5820-5827
36. Shaffer, D., Jaramillo, H., Werber, J.R., **Lin, S.**, and Elimelech, M., "Forward Osmosis: Where Are We Now?" *Desalination*, 356, 2015, pp 271-285
37. **Lin, S.**, Nejati, S., Boo, C., Hu, Y., Chinedum, O., and Elimelech, M., "Omniphobic Membrane for Robust Membrane Distillation", *Environmental Science & Technology-Letters*, 1(11), 2014, pp 443-447
38. A.P. Straub, **Lin, S.**, and Elimelech, M., "Pressure Retarded Osmosis: Practical Performance and Module Scale Operational Factors", *Environmental Science & Technology*, 48(20), 2014, Pp 12435-12444
39. **Lin, S.**, A.P. Straub, and Elimelech, M., "Thermodynamic Limits of Extractable Energy by Pressure Retarded Osmosis", *Energy & Environmental Science*, 7, 2014, pp 2706-2715.
40. **Lin, S.**, Yip, N.Y., Cath, T.Y., Osuji, C.O., and Elimelech, M., "Hybrid Pressure Retarded Osmosis—Membrane Distillation System for Power Generation from Low-grade Heat: Thermodynamic Analysis and Energy Efficiency", *Environmental Science & Technology*, 48(9), 2014, pp 5306-5317
41. Hotze, E.M., Louie, S.M., **Lin, S.**, Wiesner, M.R., Lowry, G.V. "Nanoparticle Core Properties Affect Attachment of Macromolecule-coated Nanoparticles to Silica Surfaces", *Environmental Chemistry*, 13(3), 2014, pp 257-267
42. **Lin, S.**, Yip, N.Y., and Elimelech, M., "Direct Contact Membrane Distillation with Heat Recovery: Thermodynamic Insights from Module Scale Modeling", *Journal of Membrane Science*, 453, 2014, pp 498-515
43. Yang, X., **Lin, S.**, Wiesner, M.R., "Influence of Natural Organic Matter on Transport and Retention of Polymer Coated Silver Nanoparticles in Porous Media", *Journal of Hazardous Materials*, 264, 2014, pp 161-168
44. **Lin, S.**[#], Huang, R. [#], Cheng, Y., Liu, J., Lau, B., and Wiesner, M.R., "Silver Nanoparticle-Alginate Composite Beads for Point-of-Use Drinking Water Disinfection", *Water Research*, 47(21), 2013, Pp 3959-3965 ([#]Equal Contribution)
45. Ferris, R., **Lin, S.**, Therezien, M., Yellen, B.B., and Zauscher, S., "Electrical Double Layer Formed by Polarized Ferroelectric Thin Films", *ACS Applied Materials and Interfaces*, 5(7), 2013, pp 2610-2617
46. Chae, S.R., Hotze, E.M., Badireddy, A.R., **Lin, S.**, Kim, J.O., Wiesner, M.R., "Environmental implications and applications of carbon nanomaterials in water treatment", *Water Science & Technology*, 67 (11), 2013, pp 2582-2586
47. **Lin, S.** and Wiesner, M.R., "Deposition of Aggregated Nanoparticles— A Theoretical and Experimental Study on the Effect of Aggregation State on the Affinity between Nanoparticles and a Collector Surface", *Environmental Science & Technology*, 46(24), 2012, pp 13270-13277

48. **Lin, S.** and Wiesner, M.R., "Theoretical Investigation of Steric Interaction in Colloidal Deposition", *Langmuir*, 28(43), 2012, pp 15233-15245
49. **Lin, S.** and Wiesner, M.R., "Paradox of Stability of Nanoparticles at Very Low Ionic Strength", *Langmuir*, 28(30), 2012, pp 11032-11041
50. **Lin, S.** and Wiesner, M.R., "Theoretical Investigation on the Interaction between a Soft Particle and a Rigid Flat Surface", *Chemical Engineering Journal*, 191, 2012, pp 297-305
51. **Lin, S.**, Cheng, Y., Liu, J., and Wiesner, M.R., "Polymeric Coatings on Silver Nanoparticles Hinder Auto-aggregation but Enhance Attachment to Uncoated Surfaces", *Langmuir*, 26(22), 2012, Pp 4178-4186
52. Zhang, L., Chae, S-R., **Lin, S.**, and Wiesner, M.R., "Proton-conducting Composite Membranes Derived from Ferroxane-Polyvinyl Alcohol Complex", *Environmental Engineering Science*, 29(2), 2012, Pp 124-132
53. Chae, S., Xiao, Y., **Lin, S.**, Noeiaghahi, T., Kim, J., and Wiesner, M.R., Effects of humic acid and electrolytes on photocatalytic reactivity and transport of carbon nanoparticle aggregates in water, *Water Research*, 46(13), 2012, Pp 4053-4062
54. **Lin, S.**, Cheng, Y., Bobcombe, Y., Jones, K.L., Liu, J., and Wiesner, M.R. "Deposition of Silver Nanoparticles in Geochemically Heterogeneous Porous Media: Predicting Affinity from Surface Composition Analysis", *Environmental Science & Technology*, 45(12), 2011, Pp 5209-5215
55. Chae, S-R., Therezien, M., Farner Budarz, J., Wessel, L., **Lin, S.**, Xiao, Y., and Wiesner, M.R., "Comparison of the Photosensitivity and Bacterial Toxicity of Spherical and Tubular Fullerenes of Variable Aggregate Size", *Journal of Nanoparticle Research*, 13(10), 2011, Pp 5121-5127
56. Shawky, H.A., Chae, S-R., **Lin, S.**, and Wiesner, M.R., "Synthesis and Characterization of a Carbon Nanotube/Polymer Nanocomposite membrane for Water Treatment" *Desalination*, 272, 2011, pp 46-50
57. **Lin, S.**, and Wiesner, M.R. "Exact Analytical Expressions for the Potential of Electrical Double Layer Interactions for a Sphere-Plate System", *Langmuir*, 26(22), 2010, Pp 16638-16641
58. Cheng, Y., Yin, L., **Lin, S.**, Wiesner, M.R., Bernhardt, E., and Liu, L. "Toxicity Reduction of Polymer-Stabilized Silver Nanoparticles by Sunlight", *Journal of Physical Chemistry C*, 115(11), 2010, Pp 4425-4432
59. Chae, S-R., Badireddy, A.R., Farner Budarz, J., **Lin, S.**, Xiao, Y., Therezien, M., and Wiesner, M.R., "Heterogeneities in Fullerene Nanoparticle Aggregates Affecting Reactivity, Bioactivity, and Transport", *ACS Nano*, 4(9), 2010, pp 5011-5018

Invited Seminars

1. "Progress in understanding and mitigating fouling, wetting, and scaling in membrane distillation", Xiamen University, Xiamen, China, 07/02/2019
2. "Energy Efficiency and Performance Evaluation for Capacitive Deionization", Shanghai Jiaotong University, Shanghai, China, 06/26/2019
3. "Energy Efficiency of Desalination" Sun Yet-sen University, Guangzhou, Guangdong, China, 06/21/2016

4. "Energy Efficiency of Desalination", University of Science and Technology of China, Hefei, Anhui, China, 06/20/2019
5. "Performance Evaluation for Capacitive Deionization", University of Science and Technology of China, Hefei, Anhui, China, 06/20/2019
6. "Energy Efficiency of Desalination and Design Principles of NF Membranes", Suzhou Institute of Nano-Tech and Nano-Bionics, Suzhou, Jiangsu, China, 06/17/2019
7. "Capacitive Deionization: Energy Efficiency and System Operation" Shandong University, Qingdao, Shandong, China, 06/11/2019
8. "Progress in understanding and mitigating fouling, wetting, and scaling in membrane distillation", Shandong University, Shandong, China, 06/11/2019
9. "Capacitive Deionization: Energy Efficiency and System Operation" Harbin Institute of Technology, Harbin, Heilongjiang, China, 06/05/2019
10. "Pore wetting in membrane distillation: detection, mechanism, and solution", Shanghai Advanced Research Institute, Shanghai, China, 06/02/2018
11. "Energy Efficiency of Desalination", Tianjin Polytechnic University, Tianjin, China, 05/29/2019
12. "Energy Efficiency of Desalination", Nankai University, Tianjin, China, 05/28/2019
13. "Energy Efficiency of Desalination and Research Activities in the Lin Lab", Institute of Process Engineering of the Chinese Academy of Sciences, Beijing, China, 05/24/2019
14. "Energy Efficiency of Desalination and Research Activities in the Lin Lab", Research Center for Eco-Environmental Research of the Chinese Academy of Sciences, Beijing, China, 05/22/2019
15. "Pore wetting in membrane distillation: detection, mechanism, and solution", University of Tennessee, Knoxville, TN, 04/19/2018
16. "Wetting in membrane distillation: relevance, detection, dynamics, and solution", Tennessee State University, Nashville, TN, 09/28/2017
17. "Developing anti-wetting and anti-fouling membranes for membrane distillation with challenging applications", Dow Company, Lake Jackson, TX, 07/18/2017
18. "Anti-fouling and anti-wetting membrane distillation using membranes with special wettability" U.S. Army Engineer Research and Development Center, Vicksburg, MS, 04/19/2017
19. "Membrane-based desalination: fundamentals, challenges, and potential areas for technical innovations", Chinese Academy of Science, Suzhou Institute of Nano-Tech and Nano-Bionics, Suzhou, Jiangsu, China, 12/30/2016
20. "Developing anti-fouling and anti-wetting membranes for membrane distillation" Huazhong University of Science and Technology, Wuhan, Hubei, China, 12/27/2016
21. "Developing anti-fouling and anti-wetting membranes for membrane distillation" Sun Yet-sen University, Guangzhou, Guangdong, China, 12/21/2016
22. "Developing anti-fouling and anti-wetting membranes for membrane distillation" Ji-nan University, Guangzhou, Guangdong, China, 10/14/2016

23. "Membrane-based desalination: fundamentals, challenges, and potential areas for technical innovations", Oak Ridge National Lab, Oak Ridge, TN, 12/30/2016
24. "Expanding the Versatility of Membrane Distillation via Materials Innovation", Clemson University, Clemson, SC, March, 2016
25. "Membrane distillation: thermodynamic analysis and novel membrane development" Sichuan Agricultural University, Chengdu, Sichuan, China, November, 2015
26. "Membrane distillation for improving sustainability at water-energy-environment nexus", University of Michigan, Ann Arbor, MI, February, 2014
27. "Membrane distillation: thermodynamic analysis and novel membrane development", University of Massachusetts, Amherst, MA, September, 2014