

# Sidan Lu

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## Summary

Curious and driven researcher with deep expertise in electrochemical systems, membrane technologies, and resource recovery for sustainable applications. I have extensive hands-on experience designing, operating, and optimizing aqueous and non-aqueous electrochemical reactors for hydrogen production, wastewater treatment, and nutrients and organic acid recovery from renewable and waste-derived sources. My work combines electrochemical cell design with advanced materials characterization, guided by a strong commitment to circular economy principles, carbon reduction, and system-level innovation. Currently, I'm focused on advancing low-carbon, electro-driven processes for resource recovery and green materials development.

## Appointment

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- 2024.09- **Postdoctoral Research Associate at Yale University**  
Topic: One-pot electrochemical synthesis of adipic acid from lignin-derived catechol  
Advisors: Paul Anastas and Julie Zimmerman
- 2021.07-2024.08 **Postdoctoral Research Associate at Princeton University**  
Topic 1: Carbon redirection in wastewater anaerobic treatment for selective organic acids production  
Topic 2: Electro-membrane for pH-swing and in-situ distillation processes for organic acids extraction and separation from pH-neutral wastewater  
Topic 3: Electro-fabric distillation for clean water production from brine  
Advisor: Z. Jason Ren

## Education and Training

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- 2017.08-2021.05 **Ph.D. in Environmental Engineering from Louisiana State University**  
Topic: Resource and energy recovery from wastewater using advanced (bio)electrochemical systems  
Advisor: Xiuping Zhu
- 2014.08-2017.05 **M.S. in Environmental Science from Beijing Normal University**  
Topic: Nitrogen recycling-related microbial ecology in nature waters  
Advisor: Yujiao Sun
- 2010.08-2014.05 **B.S. in Environmental Engineering from Harbin Institute of Technology**

## Peer Reviewed Publications (11 first author, h-index 11)

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1. **Sidan Lu**, Allyson McGaughey, Sungju Im, Yiming Liu, Xinyi Wang, Aaron Leininger, David Jassby, Eric Hoek, and Zhiyong Jason Ren\*. Membrane electrolysis distillation for volatile fatty acids extraction from pH-neutral fermented wastewater. *Water Research* 265, 122306, 2024. DOI: [10.1016/j.watres.2024.122306](https://doi.org/10.1016/j.watres.2024.122306)
2. Leininger, Aaron, **Sidan Lu**, Jinyue Jiang, Yanhong Bian, Harold D. May, and Zhiyong Jason Ren\*. The convergence of lactic acid microbiomes and metabolites in long-term electrofermentation. *Environmental Science and Ecotechnology* 22, 100459, 2024. DOI: [10.1016/j.esec.2024.100459](https://doi.org/10.1016/j.esec.2024.100459)
3. **Sidan Lu**, Aaron Leininger, David Jassby, Eric M. V. Hoek, Zhiyong Jason Ren\*. Temperature dependence of acids recovery from wastewater electro-fermentation. *Resources, Conservation and Recycling* 203, 147407, 2024. DOI: [10.1016/j.resconrec.2024.107407](https://doi.org/10.1016/j.resconrec.2024.107407)
4. Sungju Im, Bongyeon Jung, Xinyi Wang, Jishan Wu, Minhao Xiao, Xin Chen, Javier A. Quezada-Renteria, Arpita Iddya, Derrick Dlamini, **Sidan Lu**, Christos T. Maravelias, Zhiyong Jason Ren, Eric M. V. Hoek\*, David Jassby\*. High-efficiency recovery of acetic acid from water using electroactive gas-stripping membranes. *Environmental Science & Technology* 57 (27), 10096–10106, 2023. DOI: [10.1021/acs.est.3c01357](https://doi.org/10.1021/acs.est.3c01357)
5. Wang, Xinyi, Sungju Im, Bongyeon Jung, Jishan Wu, Arpita Iddya, Quezada-Renteria A. Javier, Minhao Xiao, **Sidan Lu**, Byun Jaewon, Jeffrey Zhang, Zhiyong Jason Ren, Christos T. Maravelias, Eric M.V. Hoek\*, David Jassby\*. Simple and low-cost electroactive membranes for ammonia recovery. *Environmental Science & Technology* 57 (25), 9405–9415, 2023. DOI: [10.1021/acs.est.3c01470](https://doi.org/10.1021/acs.est.3c01470)
6. **Sidan Lu**, Weiliang Sun, Xiuping Zhu\*. Synergistic effects between dual-photoelectrodes and bioanode enhance sustainable hydrogen and electricity production from wastewater. *Resources, Conservation and Recycling* (183), 106367, 2022. DOI: [10.1016/j.resconrec.2022.106367](https://doi.org/10.1016/j.resconrec.2022.106367)
7. Alessandro Galia, Guangcai Tan, Massimo Marino, Federica Proietto, Onofrio Sciald one, **Sidan Lu**, Xiuping Zhu\*. Special engines. *Salinity Gradient Heat Engines* 302, 2021. DOI: [10.1016/B978-0-08-102847-6.00007-3](https://doi.org/10.1016/B978-0-08-102847-6.00007-3)
8. **Sidan Lu**, Jun Lan, Weiliang Sun, Xiaojia He, Xiuping Zhu\*. High energy recovery from salinity gradients in a concentration flow cell enhanced by bioelectrochemical currents. *Chemical Engineering Journal* (426), 130826, 2021. DOI: [10.1016/j.cej.2021.130826](https://doi.org/10.1016/j.cej.2021.130826)
9. **Sidan Lu**, Baiyun Lu, Guangcai Tan, William Moe, Wangwang Xu, Ying Wang, Defeng Xing, Xiuping Zhu\*. Mo<sub>2</sub>N nanobelt cathodes for efficient hydrogen production in microbial electrolysis cells with shaped biofilm microbiome. *Biosensors and Bioelectronics* (167), 112491, 2020. DOI: [10.1016/j.bios.2020.112491](https://doi.org/10.1016/j.bios.2020.112491)
10. Guangcai Tan, **Sidan Lu**, Nan Xu, Dingxue Gao, Xiuping Zhu\*. Pseudocapacitive behaviors of polypyrrole grafted activated carbon and MnO<sub>2</sub> electrodes to enable fast and efficient

- membrane-free capacitive deionization. *Environmental Science & Technology* (54), 9, 2020. DOI: [10.1021/acs.est.9b07182](https://doi.org/10.1021/acs.est.9b07182)
11. **Sidan Lu**, Yujiao Sun\*, Baiyun Lu, Danyang Zheng, Shangwei Xu. Change of abundance and correlation of *Nitrospira inopinata*-like comammox and populations in nitrogen cycle during different seasons. *Chemosphere* (241), 125098, 2020 DOI: [10.1016/j.chemosphere.2019.125098](https://doi.org/10.1016/j.chemosphere.2019.125098)
  12. **Sidan Lu**, Guangcai Tan, Xiuping Zhu\*. H<sub>2</sub> evolution catalysts for microbial electrolysis cells (Book chapter). *Novel Catalyst Materials For Bioelectrochemical Systems: Fundamentals and Applications*, American Chemical Society 27-43, 2020. DOI: [10.1021/bk-2020-1342.ch002](https://doi.org/10.1021/bk-2020-1342.ch002)
  13. Guangcai Tan, **Sidan Lu**, Jizhou Fan, Guoqiang Li, Xiuping Zhu\*. Chloride-ion concentration flow cells for efficient salinity gradient energy recovery with bismuth oxychloride electrodes. *Electrochimica Acta* (322), 134724, 2019. DOI: [10.1016/j.electacta.2019.134724](https://doi.org/10.1016/j.electacta.2019.134724)
  14. **Sidan Lu**, Hongna Li, Guangcai Tan, Fang Wen, Michael T Flynn, Xiuping Zhu\*. Resource recovery microbial fuel cells for urine-containing wastewater treatment without external energy consumption. *Chemical Engineering Journal* (373), 1072-1080. 2019. DOI: [10.1016/j.cej.2019.05.130](https://doi.org/10.1016/j.cej.2019.05.130)
  15. **Sidan Lu**, Binghan Xie, Bingfeng Liu, Baiyun Lu, Defeng Xing\*. Neglected effects of inoculum preservation on the start-up of psychrophilic bioelectrochemical systems and shaping bacterial communities at low temperature. *Frontiers in Microbiology* (10), 935, 2020. DOI: [10.3389/fmicb.2019.00935](https://doi.org/10.3389/fmicb.2019.00935)
  16. Tan, Guangcai, Hongna Li, Haihui Zhu, **Sidan Lu**, Jizhou Fan, Guoqiang Li, and Xiuping Zhu\*. Concentration flow cells based on chloride-ion extraction and insertion with metal chloride electrodes for efficient salinity gradient energy harvest. *ACS Sustainable Chemistry & Engineering* (11), 6, 15212-15218, 2018. DOI: [10.1021/acssuschemeng.8b03657](https://doi.org/10.1021/acssuschemeng.8b03657)
  17. Yujiao Sun\*, **Sidan Lu**, Xuan Zhao, Aizhong Ding, Lei Wang. Long-term oil pollution and in situ microbial response of groundwater in northwest China. *Archives of Environmental Contamination and Toxicology* (72), 4, 2016. DOI: [10.1007/s00244-017-0405-x](https://doi.org/10.1007/s00244-017-0405-x)
  18. **Sidan Lu**, Yujiao Sun\*, Xuan Zha, Lei Wang, Danyang Zheng. Impact of precipitation on Fenghe River water and aquatic microorganisms. *Environmental Science* 7-19, 2016. DOI: [10.13227/j.hjlx.2016.07.019](https://doi.org/10.13227/j.hjlx.2016.07.019)
  19. **Sidan Lu**, Yujiao Sun\*, Xuan Zhao, Lei Wang, Aizhong Ding, Xiaohui Zhao. Sequencing insights into microbial communities in the water and sediments of Fenghe River, China. *Archives of Environmental Contamination and Toxicology* (71), 122-132, 2016. DOI: [10.1007/s00244-016-0277-5](https://doi.org/10.1007/s00244-016-0277-5)
  20. Danyang Zheng, Yujiao Sun\*, Huijuan Li, **Sidan Lu**, Mingjun Shan, Shangwei Xu. Multistage AO activated sludge process for paraformaldehyde wastewater treatment and microbial community structure analysis. *Journal of Chemistry* 2016. DOI: [10.1155/2016/2746715](https://doi.org/10.1155/2016/2746715)

## In preparation

1. **Sidan Lu**, Fang Lin, Mahlet Garedew, Ho Yin Tse, Andrew Champlin, Hanno Erythropel, Julie Zimmerman, Paul Anastas\* One-pot electrochemical synthesis of adipic acid from lignin-derived catechol. 2025
2. Laurene Petitjean, Mahlet Garedew, **Sidan Lu**, Theodora Matringe, Hanno Erythropel, Chun-Ho Lam\*, Paul T. Anastas\* Renewable Catechols from Lignin: A versatile platform for chemical and material applications. 2025
3. **Sidan Lu**, Meiqi Yang, Xinyi Wang, Aaron Leininger, David Jassby, Eric Hoek, Zhiyong Jason Ren\*. Conductive fabric distillation for interfacial clean water production. 2024

## Research Grants & Funded Projects

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**Project Title** “Lignin to jet-range aromatic hydrocarbons by an advanced electrochemical approach” Funded by Southwest Airlines (via Yale School of the Environment), 2025

- Proposal accepted for funded research collaboration with Southwest Airlines.
- Sole author on original submission; revised version included advisor and lab manager as collaborators.
- Led project development and proposal writing, responsible for project execution.

## Presentations

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Contributed talk: **Sidan Lu** Solar-biased microbial electrolysis cells for hydrogen production under visible light irradiation. Graduate Student Research Conference, LSU. 2021

Contributed talk: **Sidan Lu** Resources recovery from wastewater using advanced bioelectrochemical systems. The 4th International Young Scholars Shenzhou Forum, Harbin, China, 2019

Contributed talk: **Sidan Lu** Long-term oil pollution and in situ microbial response of groundwater. IWA Congress and Exhibition. Brisbane, Australia, 2016

Poster presentation: **Sidan Lu** Membrane electrolysis distillation (MED) for volatile fatty acids separation from pH-neutral fermented wastewater. ISMET, Houston, U.S., 2024

Poster presentation: **Sidan Lu** Temperature dependence of acids recovery from wastewater electro-fermentation. AEESP, Boston, U.S., 2023

Poster presentation: **Sidan Lu** Resource recovery microbial fuel cells for urine-containing wastewater treatment without external energy consumption. ISMET7, Okinawa, Japan, 2019

Poster presentation: **Sidan Lu** Mo<sub>2</sub>N nanobelt cathodes for efficient hydrogen production in microbial electrolysis cells. The 4th IWA Conference of Science Summit on Urban Water. Harbin, China, 2018

Poster presentation: **Sidan Lu** Resource-recovery microbial fuel cells for space wastewater treatment. Louisiana Space Fall Council Meeting. Baton Rouge, U.S., 2017

## **Honors and Awards**

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### **Oral presentation award in the LSU Graduate Student Research Conference. 2021**

Competition

### **LSU Graduate School Economic Development Award (2019)**

Award to doctoral students whose study and/or research will directly affect the economic development of Louisiana and are to be used to attract superior doctoral graduate students to the program

### **Oral presentation award in the 4th IWA Conference of Science Summit on Urban Water (2018)**

### **National Graduate Student Scholarship (China) (2016)**

Applicants evaluated based on the academic performance, research achievements, and overall abilities on a national scale

### **BNU Graduate School First-Class Scholarship (2014)**

### **Third Prize in the National Youth Scientific Innovation Contest (2014)**

### **Participated in National University Science and Technology Innovation Contest (2012)**

## **Teaching and Mentoring**

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Guest lecture–Undergraduate Course ENEG 4780: Renewable Energy and Power Generation

Credit: 2/16, Number of Students: 10 (Louisiana State University, Spring 2019)

Guest lecture–Graduate Course CE 7105: Advanced Topics in Water Quality and Treatment

Credit: 2/16, Number of Students: 30 (Louisiana State University, Fall 2017)

Graduate Student Co-Mentoring

Aaron Leininger (Princeton University, 2021–2024)

Undergraduate students Mentoring

Toby Jiang (Louisiana State University, 2019–2021)

Alexander T. Pluta (Louisiana State University, 2017–2020)

## **Professional Activities**

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### **Peer Reviewer (13 manuscripts)**

- Bioresource & Technology (2 manuscripts)
- Environmental Science: Water Research & Technology (2 manuscripts)
- Science of The Total Environment (2 manuscripts)

- Joule (1 manuscript)
- Environmental Science & Technology (1 manuscript)
- Chemosphere (1 manuscript)
- Environmental Pollution (1 manuscript)
- BioMed Research International (1 manuscript)
- ACS Sustainable Chemistry & Engineering (1 manuscript)\
- Frontier in Microbiology (1 manuscript)

#### **Scientific Committee and Proposal Review Panel**

- National Science Foundation (2024)
- The 17th IWA World Congress on Anaerobic Digestion (2022)

#### **Affiliations**

- American Chemical Society (ACS)
- Association of Environmental Engineering and Science Professors (AEESP)