

Ran Mei

Assistant Professor

Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign

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EDUCATION

- 2020 Ph.D., Environmental Engineering, **University of Illinois Urbana-Champaign**, USA
Dissertation: Investigating the roles of microbial immigration in wastewater treatment processes
Advisor: Professor Wen-Tso Liu
- 2015 M.S., Environmental Engineering, **University of Illinois Urbana-Champaign**, USA
Thesis: Microbial community responses of an anaerobic enrichment to temperature shocks
Advisor: Professor Wen-Tso Liu
- 2013 B.S., Energy and Resources Engineering, **Peking University**, China
Thesis: Identification, function evaluation, and genome analysis of a novel bacterial species isolated from Daqing oil field
Advisor: Professor Xiaolei Wu

ACADEMIC POSITIONS

- 2024-now Assistant Professor
Department of Civil and Environmental Engineering, **University of Illinois Urbana-Champaign**, USA
- 2023-2024 Postdoctoral Fellow
Institute for Extra-cutting-edge Science and Technology Avant-garde Research (X-star), **Japan Agency for Marine-Earth Science and Technology (JAMSTEC)**, Japan
- 2021-2023 Postdoctoral Fellow
Bioproduction Research Institute, **National Institute of Advanced Industrial Science and Technology (AIST)**, Japan

RESEARCH INTEREST

Water and Wastewater Treatment; Environmental Biotechnology; Microbial Ecology; Anaerobic Metabolism; Methanogenesis; Archaea; Microbial Evolution

HONORS AND AWARDS

- 2023 CSP New Investigator Award, Joint Genome Institute, USA Department of Energy
- 2022 Postdoctoral Fellowship for Research in Japan, Japan Society for the Promotion of Science
- 2021 Jacobs Engineering Group/AEESP Outstanding Doctoral Dissertation Award, Association of Environmental Engineering and Science Professors
- 2020 Outstanding Self-financed Students Abroad, China Scholarship Council
- 2020 Engelbrecht Fellowship, University of Illinois Urbana-Champaign
- 2019 Warren W. Yee Memorial Fellowship, University of Illinois Urbana-Champaign
- 2013 Civil & Environmental Engineering Department Fellowship, University of Illinois Urbana-Champaign

- 2012 Yihai Kerry Scholarship, Peking University
 2011 Kwang-Hua Scholarship, Peking University

FUNDED RESEARCH

- 2025-2026 IIN Sustaining Illinois Seed Grant Program
From Waste to Wealth: Exploring the Potential of an Extremophilic Alga for Thriving and Biofuel Production in a Microplastic-Impacted Environment (17.6k USD to RM)
Co-PI (Lead PI: Dr. Himali M. K. Delanka-Pedige)
- 2024-2025 University Academic Alliance in Taiwan-University of Illinois System Joint Research Project
Innovative Aeration Strategies for Achieving Sustainability and Carbon Neutrality in Urban Wastewater Treatment (75k USD to RM)
PI (PI on UAAT side: Dr. Jer-Horng Wu; co-PI: Dr. Chang-Ping Yu; Dr. Yu-Wei Wu)
- 2023-2026 Community Sequencing Program New Investigator Award, Joint Genome Institute, Department of Energy, USA
Unraveling the interplay between sediment microorganisms in biomass consumption (in-kind sequencing of 3 TB genomic data, ~60k USD equivalent)
PI (co-PI: Dr. Masaru K. Nobu; Dr. Hiroyuki Imachi)
- 2022-2024 Grant-in-Aid for JSPS Fellow, Japan Society for the Promotion of Science, Japan
Global gene cataloging-based reconstruction of the evolutionary transition from simple to complex cells (2.2 mil JPY).
Foreign Research Fellow (Host researcher: Dr. Masaru K. Nobu)

PUBLICATIONS

Peer-reviewed journal articles (*corresponding author, †co-first authors)

- Hirakata, Y., **Mei, R.**, Morinaga K., Katayama T., Tamaki H., Meng X.Y., Watari T., Yamaguchi T., Hatamoto M., & Nobu, M.K.*, 2023. Discovery of anaerobic bacterial scavengers of dead cells. *The ISME Journal*, 17 (12). 10.1038/s41396-023-01538-2
- Mei, R.**, Kaneko, M., Imachi, H., & Nobu, M.K.*, 2023. The origin and evolution of methanogenesis and *Archaea* are intertwined. *PNAS Nexus*, 2 (2). 10.1093/pnasnexus/pgad023
- Mei, R.** & Liu, W.T.*, 2022. Meta-omics supervised characterization of respiration activities associated with microbial immigration in anaerobic digestion. *Environmental Science & Technology*, 56 (10). 10.1021/acs.est.2c01029
- Kim, J.†, **Mei, R.†**, Wilson, F.P., Yuan, H., Bocher, B.T.W., & Liu, W.T.*, 2020. Ecogenomics-based mass balance model reveals the effects of fermentation conditions on microbial activity. *Frontiers in Microbiology*, 11. 10.3389/fmicb.2020.595036
- Nobu, M.K.†, Narihiro, T.†, **Mei, R.**, Kamagata, Y., Lee, P.H., Lee, P.K., McInerney, M.J., & Liu, W.T.*, 2020. Catabolism and interactions of uncultured organisms shaped by eco-thermodynamics in methanogenic bioprocesses. *Microbiome*, 8. 10.1186/s40168-020-00885-y
- Ye, L.*, **Mei, R.**, Liu, W.T., Ren H., & Zhang, X.X.*, 2020. Machine learning-aided analyses of thousands of draft genomes reveal specific features of activated sludge processes. *Microbiome*, 8. 10.1186/s40168-020-0794-3
- Mei, R.**, Nobu, M.K., Narihiro, T., & Liu, W.T.*, 2020. Metagenomic and metatranscriptomic analyses revealed uncultured *Bacteroidales* populations as the dominant proteolytic amino acid degraders in anaerobic digesters. *Frontiers in Microbiology*, 11. 10.3389/fmicb.2020.593006

8. Lam, Y.C.†, **Mei, R.**†, Wu, Z., Lee, P.K., Liu, W.T.*, & Lee, P.H.*, 2020. Superior resolution characterization of microbial diversity in anaerobic digesters using full-length 16S rRNA gene amplicon sequencing. *Water Research*, 178. 10.1016/j.watres.2020.115815
9. **Mei, R.**, Nobu, M.K., & Liu, W.T.*, 2020. Identifying anaerobic amino acids degraders through the comparison of short-term and long-term enrichments. *Environmental Microbiology Reports*, 12 (2). 10.1111/1758-2229.12821
10. Sun, H., **Mei, R.**, Zhang, X.X., Ren H., Liu, W.T., & Ye, L.*, 2019. Bacterial enrichment in highly selective acetate-fed bioreactors and its application in rapid biofilm formation. *Water Research*, 170. 10.1016/j.watres.2019.115359
11. **Mei, R.** & Liu, W.T.*, 2019. Quantifying the contribution of microbial immigration in engineered water systems. *Microbiome*, 7. 10.1186/s40168-019-0760-0
12. **Mei, R.**, Kim, J., Wilson, F.P., Bocher, B.T.W., & Liu, W.T.*, 2019. Coupling growth kinetics model and machine learning quantifies microbial immigration impacts and identifies key environmental parameters in a biological wastewater treatment process. *Microbiome*, 7. 10.1186/s40168-019-0682-x
13. Yuan, H., **Mei, R.**, Liao, J., & Liu, W.T.*, 2019. Nexus of stochastic and deterministic processes on microbial community assembly in biological systems. *Frontiers in Microbiology*, 10. 10.3389/fmicb.2019.01536
14. Zealand, A. M., **Mei, R.**, Papachristodoulou, P., Roskilly, A. P., Liu, W. T., & Graham, D. W.*, 2019. Molecular microbial ecology of stable versus failing rice straw anaerobic digesters. *Microbial Biotechnology*, 12 (5). 10.1111/1751-7915.13438
15. **Mei, R.**, Nobu, M.K., Narihiro, T., Yu, J., Sathyagal, A., Willman, E., & Liu, W.T.*, 2018. Novel *Geobacter* species and diverse methanogens contribute to enhanced methane production in media-added methanogenic reactors. *Water Research*, 147. 10.1016/j.watres.2018.10.026
16. Narihiro, T.†, Nobu, M.K.†, Bocher, B.T.W., **Mei, R.**, & Liu, W.T.*, 2018. Co-occurrence network analysis reveals thermodynamics-driven microbial interactions in methanogenic bioreactors. *Environmental Microbiology Reports*, 10 (6). 10.1111/1758-2229.12689
17. Zealand, A. M., **Mei, R.**, Papachristodoulou, P., Roskilly, A. P., Liu, W. T., & Graham, D. W.*, 2018. Microbial community composition and diversity in rice straw digestion bioreactors with and without dairy manure. *Applied Microbiology and Biotechnology*, 102 (19). 10.1007/s00253-018-9243-7
18. Nobu, M.K.†, Narihiro, T.†, Liu, M.M., Kuroda, K., **Mei, R.**, & Liu, W.T.*, 2017. Thermodynamically diverse syntrophic aromatic compound catabolism. *Environmental Microbiology*, 19 (11). 10.1111/1462-2920.13922
19. **Mei, R.**, Nobu, M.K., Narihiro, T., Kuroda, K., Sierra, J., Wu, Z.Y., Ye, L., Lee, P.K.H., Lee, P.H., van Lier, J.B., McInerney, M.J., Kamagata, Y., & Liu, W.T.*, 2017. Operation-driven heterogeneity and overlooked feed-associated populations in anaerobic digester microbiome. *Water Research*, 124. 10.1016/j.watres.2017.07.050
20. Kuroda, K.†, Nobu, M.K.†, **Mei, R.**, Narihiro, T., Bocher, B.T., Yamaguchi, T., & Liu, W.T.*, 2016. A single-granule-level approach reveals ecological heterogeneity in an upflow anaerobic sludge blanket reactor. *PLOS ONE*, 11 (12). 10.1371/journal.pone.0167788
21. **Mei, R.**, Narihiro, T., Nobu, M.K., & Liu, W.T.*, 2016. Effects of heat shocks on microbial community structure and microbial activity of a methanogenic enrichment degrading benzoate. *Letters in Applied Microbiology*, 63 (5). 10.1111/lam.12629
22. Nobu, M.K., Narihiro, T., Kuroda, K., **Mei, R.**, & Liu, W.T.*, 2016. Chasing the elusive Euryarchaeota class WSA2: genomes reveal a uniquely fastidious methyl-reducing methanogen. *The ISME Journal*, 10 (10). 10.1038/ismej.2016.33
23. **Mei, R.**, Narihiro, T., Nobu, M.K., Kuroda, K., & Liu, W.T.*, 2016. Evaluating digestion efficiency in full-scale anaerobic digesters by identifying active microbial populations through the lens of microbial activity. *Scientific Reports*, 6. 10.1038/srep34090

24. Pan, X.C.[†], Geng, S., Lv, X.L.[†], **Mei, R.**, Jiangyang, J.H., Wang, Y.N., Xu, L., Liu, X.Y., Tang, Y.Q., Wang, G.J., & Wu, X.L.*[‡], 2015. *Defluviimonas alba* sp. nov., isolated from an oilfield. **International Journal of Systematic and Evolutionary Microbiology**, 65 (6). 10.1099/ij.s.0.000181
25. Narihiro, T., Kim, N.K., **Mei, R.**, Nobu, M.K., & Liu, W.T.*[‡], 2015. Microbial community analysis of anaerobic reactors treating soft drink wastewater. **PLOS ONE**, 10 (3). 10.1371/journal.pone.0119131
26. Geng, S., Pan, X.C., **Mei, R.**, Wang, Y.N., Liu, X.Y., Wang, X.B., Tang, Y.Q., & Wu, X.L.*[‡], 2015. *Glycocalyx alkaliphilus* sp. nov., a dimorphic prosthecate bacterium isolated from crude oil. **International Journal of Systematic and Evolutionary Microbiology**, 65 (3). 10.1099/ij.s.0.000023
27. Geng, S., Pan, X.C., **Mei, R.**, Wang, Y.N., Sun, J.Q., Liu, X.Y., Tang, Y.Q., & Wu, X.L.*[‡], 2015. *Paradevosia shaoguanensis* gen. nov., sp. nov., isolated from a coking wastewater. **Current Microbiology**, 70 (1). 10.1007/s00284-014-0689-2
28. Pan, X.C., Geng, S., **Mei, R.**, Wang, Y.N., Cai, H., Liu, X.Y., Tang, Y.Q., Nie, Y., Ye, S.Y., & Wu, X.L.*[‡], 2014. *Nitrateductor shengliensis* sp. nov., isolated from an oil-polluted saline soil. **Current Microbiology**, 69 (4). 10.1007/s00284-014-0624-6
29. Geng, S., Pan, X.C., **Mei, R.**, Wang, Y.N., Sun, J.Q., Liu, X.Y., Tang, Y.Q., & Wu, X.L.*[‡], 2014. *Ottonia shaoguanensis* sp. nov., isolated from coking wastewater. **Current Microbiology**, 68 (3). 10.1007/s00284-013-0481-8

Book chapter

1. Narihiro, T., Nobu, M.K., **Mei, R.**, & Liu, W.T., 2015. Microbial community involved in anaerobic purified terephthalic acid treatment process. *Anaerobic Biotechnology: Environmental Protection and Resource Recovery*. Imperial College Press, London. 10.1142/9781783267910_0003

Unsubmitted manuscript

1. **Mei, R.**, Imachi, H., & Nobu, M.K. Archaea gene encyclopedia unveils critical branching points from simple to complex cells. In preparation.
2. Leng, L., **Mei, R.**, Qiu, Y.L., Leu, S.Y., Liu, W.T., & Nobu, M.K. Contemporary and ancient evolutionary paths behind bacteria eating plastics waste. In preparation.

PRESENTATIONS

1. New paradigm in microbiome-informed water engineering. Invited talk at Biogas Research Institute, Chengdu, China, 2024
2. The origin and evolution of methanogenesis and Archaea are intertwined. Oral presentation at 2023 AEESP Research & Education Conference, Boston, USA, 2023
3. The origin and evolution of methanogenesis and Archaea are intertwined. Oral and poster presentation at ASM Microbe, Houston, USA, 2023
4. Elucidating the diversification Archaea using comparative genomics. Invited talk at Japan Collection of Microorganisms, Tsukuba, Japan, 2023
5. Investigate microbial immigration using eco-genomics. Invited talk at Chinese Academy of Science, Beijing, China, 2022
6. Culture-dependent and independent investigation of anaerobic amino acid degraders. Invited talk at Zhejiang University, Hangzhou, China, 2021
7. Genomics-based investigation of microbial immigration in engineered ecosystems. Invited talk at Nanjing University, Nanjing, China, 2021
8. Coupling growth kinetics modeling with machine learning reveals Microbial immigration impacts and identifies key environmental parameters in a biological wastewater treatment process. Oral presentation at IWA MEWE Specialist Conference, Hiroshima, Japan, 2019
9. Identifying anaerobic amino acids degraders through the comparison of short-term and long-term enrichments. Poster presentation at IWA MEWE Specialist Conference, Hiroshima,

Japan, 2019

10. Metabolic partitioning among microbial dark matter across anaerobic digesters. Poster presentation at JGI Annual Meeting, Walnut Creek, USA, 2018
11. Distribution of populations associated with known syntrophs and methanogens in the global anaerobic digester microbiome. Oral presentation at Anaerobic Microbial Syntrophy Forum, Chengdu, China, 2017
12. Operation-driven heterogeneity and overlooked feed-associated populations in anaerobic digester microbiome. Poster presentation at IWA International Conference on AD, Beijing, China, 2017
13. Operation-driven heterogeneity and overlooked feed-associated populations in anaerobic digesters. Poster presentation at JGI Annual Meeting, Walnut Creek, USA, 2017
14. Microbiome of anaerobic digesters in 51 municipal wastewater reclamation plants. Poster presentation at The ISME Symposia, Montreal, Canada, 2016
15. Microbiome of anaerobic digesters in 51 municipal wastewater treatment plants. Poster presentation at JGI Annual Meeting, Walnut Creek, USA, 2016
16. Microbial community response of a mesophilic methanogenic enrichment to temperature perturbations. Poster presentation at ASM Microbe, New Orleans, USA, 2015

TEACHING EXPERIENCES

Teaching

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| 2025 | Instructor. CEE 538, Water Quality Control Process II, UoI |
| 2019 | Guest lecture. CEE 444, Biological Principles in Environmental Engineering, UoI |
| 2018 | Co-Instructor. CEE 540, Remediation Design, UoI |
| 2017 | Guest lecture. CEE 538, Water Quality Control Process II, UoI |
| 2016 | Guest lecture. CEE 437, Water Quality Engineering, UoI |

Mentoring

As the advisor

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| 2025-now | Yuan Fang, M.S. student |
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As an examination committee member

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| 2024 | Yoonjoo Seo, Preliminary Exam Committee |
| 2025 | Renjing Jiang, Preliminary Exam Committee |
| 2025 | Wanqi Wang, Qualifying Exam Committee |

As a senior graduate student

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| 2018-2020 | Tzu-Yu Lin, Ph.D. student
Mentored on: Ph.D. dissertation research on application of meta-omics technologies to reveal microbial ecology in anaerobic digestion.
Current position: Postdoctoral Associate at the Department of Energy, Environmental and Chemical Engineering, Washington University in St. Louis. |
| 2018-2019 | Gabriella Morales, M.S. student
Mentored on: M.S. thesis research on bioreactor-based investigation of microbial immigration.
Current position: Environmental Engineer at Idaho National Laboratory. |
| 2016-2018 | Jinha Kim, M.S. student
Mentored on: M.S. thesis research on solid waste reduction in petrochemical wastewater treatment process. |

- Current position: Ph.D. student at the Department of Civil and Environmental Engineering, Texas A&M University.
- 2016-2018 Bridget Ladell, M.S. student
Mentored on: M.S. thesis research on silver carp microbial community dynamics.
Current position: Research Specialist at the DNA Sequencing Facility at University of Wisconsin-Madison.
- 2015-2017 Junhui Liao, M.S. student
Mentored on: M.S. thesis research on microbial ecology of a reactor treating high strength wastewater.
Current position: Environmental Engineer at Jacobs.
- 2016 Qiuye (Jenny) Si, M.S. student
Mentored on: Independent research on the enhancement of biogas production from soft drink wastewater.
Current position: Environmental Engineer at Stantec.
- 2015 Lucas Rocha Melogno, visiting undergraduate student
Mentored on: Internship research on the effects of conductive materials on biological methane production.
Current position: Senior Health Scientist at ICF.
- 2014 Lama Aoudi, undergraduate student
Mentored on: The Research Experiences for Undergraduates program to test the digestibility of food waste by anaerobic digestion.
Current position: Data Scientist at Carbon Arc.
- 2014 Theodore Chan, undergraduate student
Mentored on: The Research Experiences for Undergraduates program to compile data obtained from wastewater treatment plants from around the world.
Current position: Civil Engineering at SoCore Energy.

ACTIVITIES

Journal Editor

Letters in Applied Microbiology, Junior Editor, 2023-now

Journal Reviewer

Bioengineering, Bioresource Technology, Biotechnology Reports, BMC Microbiology, Chemical Engineering Journal, Engineering, Environment International, Environmental Microbiology Reports, Environmental Science & Technology, Frontiers in Microbiology, iMeta, Journal of Hazardous Materials, mSphere, Nature Communications, PLOS ONE, Science of the Total Environment, Water Research

Professional Memberships

American Society of Microbiology (ASM), Applied Microbiology International (AMI), Association of Environmental Engineering and Science Professors (AEESP), Chinese-American Professors in Environmental Engineering and Science (CAPEES), Japan Society of Microbial Ecology (JSME)

REFERENCES

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Affiliation Super-cutting-edge Grand and Advanced Research Program, Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Job title Principal Researcher

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Job title Director of Process Engineering

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Affiliation Department of Life Science and Biotechnology, National Institute of Advanced Industrial Science and Technology (AIST)
Job title Assistant Director General

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Mailing address South Kensington Campus, London SW7 2AZ, UK
Affiliation Faculty of Engineering, Department of Civil and Environmental Engineering, Imperial College London
Job title Senior Lecturer

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Affiliation Super-cutting-edge Grand and Advanced Research Program, Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
Job title Principal Researcher