



## Chungheon Shin

Research Engineer

Civil and Environmental Engineering

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### Bio

#### BIO

Chungheon Shin is the Research Director of the Codiga Resource Recovery Center at Stanford University. His work focuses on advancing sustainability through resource recovery from waste streams, with the goal of enabling engineering solutions that recover valuable resources while mitigating greenhouse gas emissions. He has developed and optimized innovative treatment processes that integrate biological and physicochemical systems across multiple scales, ranging from reaction kinetics to systems-level analysis, supported by both conventional and data-driven computational models.

He received his Ph.D. in Environmental Engineering from Inha University in South Korea, where he developed the Staged Anaerobic Fluidized-bed Membrane Bioreactor (SAF-MBR) for the recovery of clean water and energy from municipal wastewater, working with Professor Jaehoe Bae and Professor Perry L. McCarty. He subsequently served as a postdoctoral scholar in the Department of Civil and Environmental Engineering at Stanford University under the supervision of Professor Craig S. Criddle.

#### ACADEMIC APPOINTMENTS

- Research Engineer, Civil and Environmental Engineering

#### BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Affiliate, Stanford Center for Human and Planetary Health (2026 - present)

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### Teaching

#### COURSES

##### 2024-25

- Aquatic Chemistry and Biology: CEE 177 (Aut)
- Environmental Biotechnology: CEE 271B (Win)

##### 2023-24

- Environmental Biotechnology: CEE 271B (Win)

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### Publications

#### PUBLICATIONS

- **Non-growth substrate ethane perturbs core methanotrophy in obligate methanotroph *Methylosinus trichosporium* OB3b upon nutrient availability.** *Applied and environmental microbiology*  
Park, S., Shin, C., Criddle, C. S., Myung, J.

2025: e0096925

- **Anaerobic microbial core for municipal wastewater treatment - the sustainable platform for resource recovery.** *Current opinion in biotechnology*  
Conall Holohan, B., Trego, A., Keating, C., Bressani-Ribeiro, T., Chernicharo, C. L., Daigger, G., Galdi, S. M., Knörle, U., Paissoni, E., Robles, A., Rogalla, F., Shin, C., Soares, et al  
2025; 94: 103317
- **Microbial electrosynthesis technology for CO<sub>2</sub> mitigation, biomethane production, and ex-situ biogas upgrading.** *Biotechnology advances*  
Chung, T. H., Dhillon, S. K., Shin, C., Pant, D., Dhar, B. R.  
2024: 108474
- **Efficient sulfide and methane removal in anaerobic secondary effluent using a pilot-scale membrane-aerated biofilm reactor** *CHEMICAL ENGINEERING JOURNAL*  
Adem, M. K., Morris, I. C., Shin, C., Tilmans, S. H., Mitch, W. A., Criddle, C. S.  
2024; 486
- **Membrane-aerated biofilm reactor enabling simultaneous removal of ammonium and sulfide from a simulated anaerobic secondary effluent** *INTERNATIONAL BIODETERIORATION & BIODEGRADATION*  
Kim, A. H., Shin, C., Criddle, C. S.  
2024; 188
- **Obituary Perry L. McCarty 1931-2023** *NATURE SUSTAINABILITY*  
Criddle, C. S., Luthy, R. G., Rittmann, B. E., Shin, C.  
2023
- **Dissolved Methane Recovery and Trace Contaminant Fate Following Mainstream Anaerobic Treatment of Municipal Wastewater.** *ACS ES&T engineering*  
Galdi, S. M., Szczuka, A., Shin, C., Mitch, W. A., Luthy, R. G.  
2023; 3 (1): 121-130
- **Recovery of Clean Water and Ammonia from Domestic Wastewater: Impacts on Embodied Energy and Greenhouse Gas Emissions.** *Environmental science & technology*  
Shin, C., Szczuka, A., Liu, M. J., Mendoza, L., Jiang, R., Tilmans, S. H., Tarpeh, W. A., Mitch, W. A., Criddle, C. S.  
2022
- **Anaerobic membrane bioreactor model for design and prediction of domestic wastewater treatment process performance** *CHEMICAL ENGINEERING JOURNAL*  
Shin, C., Tilmans, S. H., Chen, F., Criddle, C. S.  
2021; 426
- **Temperate climate energy-positive anaerobic secondary treatment of domestic wastewater at pilot-scale.** *Water research*  
Shin, C., Tilmans, S. H., Chen, F., McCarty, P. L., Criddle, C. S.  
2021; 204: 117598
- **Optimization of reverse osmosis operational conditions to maximize ammonia removal from the effluent of an anaerobic membrane bioreactor** *ENVIRONMENTAL SCIENCE-WATER RESEARCH & TECHNOLOGY*  
Shin, C., Szczuka, A., Jiang, R., Mitch, W. A., Criddle, C. S.  
2021; 7 (4): 739–47
- **A comparative pilot-scale evaluation of gas-sparged and granular activated carbon-fluidized anaerobic membrane bioreactors for domestic wastewater treatment.** *Bioresource technology*  
Evans, P. J., Parameswaran, P. n., Lim, K. n., Bae, J. n., Shin, C. n., Ho, J. n., McCarty, P. L.  
2019: 120949
- **Current status of the pilot-scale anaerobic membrane bioreactor treatments of domestic wastewaters: A critical review** *BIORESOURCE TECHNOLOGY*  
Shin, C., Bae, J.  
2018; 247: 1038–46
- **Low energy single-staged anaerobic fluidized bed ceramic membrane bioreactor (AFCMBR) for wastewater treatment.** *Bioresource technology*

Aslam, M., McCarty, P. L., Shin, C., Bae, J., Kim, J.  
2017

- **Integrity of hollow-fiber membranes in a pilot-scale anaerobic fluidized membrane bioreactor (AFMBR) after two-years of operation** *SEPARATION AND PURIFICATION TECHNOLOGY*  
Shin, C., Kim, K., McCarty, P. L., Kim, J., Bae, J.  
2016; 162: 101-105
- **Development and application of a procedure for evaluating the long-term integrity of membranes for the anaerobic fluidized membrane bioreactor (AFMBR).** *Water science and technology*  
Shin, C., Kim, K., McCarty, P. L., Kim, J., Bae, J.  
2016; 74 (2): 457-465
- **Importance of Dissolved Methane Management When Anaerobically Treating Low-Strength Wastewaters** *CURRENT ORGANIC CHEMISTRY*  
Shin, C., McCarty, P. L., Bae, J.  
2016; 20 (26): 2810-2816
- **Anaerobic treatment of low-strength wastewater: A comparison between single and staged anaerobic fluidized bed membrane bioreactors** *BIORESOURCE TECHNOLOGY*  
Bae, J., Shin, C., Lee, E., Kim, J., McCarty, P. L.  
2014; 165: 75-80
- **Anaerobic treatment of low-strength wastewater: A comparison between single and staged anaerobic fluidized bed membrane bioreactors.** *Bioresource technology*  
Bae, J., Shin, C., Lee, E., Kim, J., McCarty, P. L.  
2014; 165: 75-80
- **Pilot-scale temperate-climate treatment of domestic wastewater with a staged anaerobic fluidized membrane bioreactor (SAF-MBR)** *BIORESOURCE TECHNOLOGY*  
Shin, C., McCarty, P. L., Kim, J., Bae, J.  
2014; 159: 95-103
- **Lower operational limits to volatile fatty acid degradation with dilute wastewaters in an anaerobic fluidized bed reactor** *BIORESOURCE TECHNOLOGY*  
Shin, C., Bae, J., McCarty, P. L.  
2012; 109: 13-20
- **Effects of influent DO/COD ratio on the performance of an anaerobic fluidized bed reactor fed low-strength synthetic wastewater** *BIORESOURCE TECHNOLOGY*  
Shin, C., Lee, E., McCarty, P. L., Bae, J.  
2011; 102 (21): 9860-9865
- **Anaerobic Fluidized Bed Membrane Bioreactor for Wastewater Treatment** *ENVIRONMENTAL SCIENCE & TECHNOLOGY*  
Kim, J., Kim, K., Ye, H., Lee, E., Shin, C., McCarty, P. L., Bae, J.  
2011; 45 (2): 576-581