

Microbes in Wastewater Treatment Plants: From Discovery to Application

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Abstract:

The optimization of wastewater treatment processes has long been constrained by the ambiguity surrounding interspecific interactions within complex microbial communities and their controllability in engineering systems. In this presentation, drawing on his recent research on microbial communities and process development, Prof. Fangang Meng will share the following key findings and advancements: (1) He has constructed a catalog of anammox bacteria and characterized the variability patterns of complex interaction networks using machine learning. Notably, his team found that the immigration of sewage microbes (e.g., fermentative bacteria) can significantly enhance nutrient removal efficiency. (2) Given the positive roles of fermentative bacteria and the challenges associated with their retention in wastewater treatment plants (WWTPs), he has developed several bioprocesses. These processes enable the achievement of simultaneous nitrification–denitrification (SND) and partial denitrification-anammox (PDA). (3) Through laboratory-scale trials, pilot-scale verification, and full-scale demonstrations, a novel membrane bio-contactor has been developed. This reactor employs in-situ volatile fatty acid (VFA) production and a counter-current substrate diffusion configuration, which effectively enhances nitrogen removal performance.



Biography:

Dr. Fangang Meng, born on March 29, 1980, is currently a Professor at Sun Yat-sen University (SYSU), China. He also serves as the Dean of Department of Environmental Engineering of SYSU. His research interests encompass environmental biotechnology, water/wastewater microbiome, and membrane-microbe process. His scientific contributions have garnered a number of accolades, including the Alexander von Humboldt Fellowship, the National Natural Science Foundation of China for Outstanding Young Scholars, Young Changjiang Scholar of the Ministry of Education, Second-Class Prize of the Guangdong Provincial Natural Science Award, recognition as a Highly Cited Chinese Researcher (since 2020), and inclusion in the list of World's Top 2% Scientists (Career-Long Impact, since 2022). Additionally, Professor Meng has served on the editorial boards of international journals, including Journal of Water Process Engineering, Frontiers in Environmental Science and Engineering, Chinese Chemical Letters.