



DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

In-Pursuit of Hybrid Anaerobic Membrane Biotechnology for Wastewater Reuse and Resource Recovery

Professor Jeonghwan Kim

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Date: October 31, 2019 (Thursday)
Time: 10:00 a.m. - 11:00 a.m.
Venue: Room 632C, Haking Wong Building
The University of Hong Kong

ABSTRACT

Growth of anaerobic membrane biotechnology research to advance resource recovery and wastewater treatment has increased rapidly. Anaerobic membrane bioreactor (AnMBR) is to combine anaerobic bioreactor with membrane filtration. The AnMBR can provide high effluent (permeate) quality at relatively short hydraulic retention time (HRT) while long solid retention time (SRT). Most importantly, the AnMBR can produce renewable energy in form of methane. However, particular concern is the accumulation of contaminants on membrane termed as fouling and its control requires much energy. Advances in AnMBR in treatment of domestic sewage have produced anaerobic fluidized bed membrane bioreactor (AFMBR) to reduce membrane fouling at low energy (less than 0.1 kWh/m^3) while improving system performance. Granular activated carbon (GAC) is often used as fluidized media to provide not only high surface area for biofilm formation but also scouring to clean membrane. Innovations of AFMBR have been proven from laboratory to pilot-scale studies, but development of alternative media to compensate disadvantages of GAC need to be made. Although significant progress has been made with various AnMBRs, there are still several major challenges that need to be resolved. The effluent produced contains high amount of nutrients without solid materials, thus post-treatments need to be considered to produce a satisfactory permeate quality that meets the non-potable reuse purposes. Alternatively, the reclaimed wastewater from AnMBR may be reused for agricultural irrigation while retaining nitrogen and phosphorous, but harvesting nutrients with microbial safety should be a key challenge.

ABOUT THE SPEAKER

Dr. Jeonghwan Kim is currently Professor at Department of Environmental Engineering at Inha University and Principle Investigator at Sustainable Environmental Membrane Technology Laboratory. He received his Ph.D. in Department of Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill in 2005. From 2006 to 2008, he worked as post-doctoral research associate in Department of Civil and Environmental Engineering at Michigan State University. He is a member of International Water Association Specialized Group of Membrane Technology, Anaerobic Digestion, Korea Society of Environmental Engineers, Korea Membrane Society, North America Membrane Society and American Chemical Society. His main research areas focus on resource recovery from wastewater, decentralized treatments, industrial wastewater treatment by developing hybrid membrane technologies including membrane bioreactors. Particularly, he has been working extensively for combining membrane materials with anaerobic bioreactors to achieve energy-positive wastewater treatment. He is currently leading several government projects related to anaerobic fluidized bed membrane bioreactor and development of ceramic membrane for anaerobic membrane bioreactor applications. He is currently Editorial Board in Journal of Chemical Technology and Biotechnology, Membrane and Water Treatment and Frontiers Bioengineering and Biotechnology.

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