Treatment of low-strength wastewaters using anaerobic or aerobic fluidized bed membrane bioreactors

by

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Abstract
Anaerobic technologies are being developed to treat wastewater that use less energy than aerobic processes by avoiding the need for wastewater aeration. Technologies such as microbial fuel cells (MFCs) produce electricity, while anaerobic fluidized bed reactors can be used to convert organic matter into methane. These processes, however, cannot reduce organic matter in the wastewater to levels needed for discharge. Anaerobic fluidized membrane bioreactors (AFMBRs) are processes that combine a fluidized bed of particles, such as granular activated carbon, with a membrane bioreactor to achieve very low effluent chemical oxygen demand (COD) concentrations at low organic loading rates. Microorganisms that grow on the GAC can decrease the effluent COD to levels suitable for discharge, and the GAC particles that are typically kept in suspension by recirculation scour the membrane, greatly reducing fouling and thus avoiding the need for chemical cleaning of the membrane. In this talk, I will show how AFMBRs have been used as a secondary process following MFCs to produce effluent CODs <20 mg/L. These systems are being further analyzed to determine limits for organic loading and useful hydraulic retention times which can be as low as 1 hour. Recent results will be presented on aerobic fluidized bed membrane bioreactors (AOFMBR) that are being investigated as a method to improve overall treatment performance and avoid the production of dissolved methane in the effluent that occurs when using AFMBRs.

About the Speaker
Professor Bruce E. Logan is a member of the US National Academy of Engineering (NAE), the Editor of ESc&T Letters, and a former Associate Editor of ESc&T. He is an Evan Pugh University Professor in Engineering, the Stan & Flora Kappe Professor of Environmental Engineering, and Director of the Engineering Energy & Environmental Institute at Penn State University. His current research efforts are in renewable production and the development of an energy sustainable water infrastructure. Dr. Logan has mentored over 120 graduate students and post docs, and is the author or co-author of over 480 refereed publications (h-index=125) and several books. He is a fellow of the American Association for the Advancement of Science (AAAS), the International Water Association (IWA), the Water Environment Federation (WEF), and the Association of Environmental Engineering & Science Professors (AEESP). Dr. Logan is a visiting professor at several universities including HIT, Tsinghua University, Dalian University of Technology (China), with ties to several other universities in Saudi Arabia, the UK, and Belgium. He received his Ph.D. in 1986 from the University of California, Berkeley. Prior to joining the faculty at Penn State in 1997, he was on the faculty at the University of Arizona in Tucson.

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