





Department of Civil Engineering
The University of Hong Kong

Distinguished Public Lecture (ONLINE)

Membrane-Based Minus Approach to Minimize Safety Risks in Treated Drinking Water

 Date: May 19, 2023 (Friday)

 Time: 7:00 p.m. - 8:00 p.m. (Hong Kong Time)

 Zoom: <https://hku.zoom.us/j/99618966690>
(Meeting ID: 996 1896 6690)

Professor Yongsheng CHEN

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Abstract

The disinfection of drinking water using chlorine-based methods was a significant public health achievement in the 20th century, as it greatly reduced the risk of waterborne diseases caused by microbes. However, today's chlorinated drinking water still poses safety concerns due to the presence of trace amounts of regulated and unregulated disinfection byproducts (DBPs), as well as other known, unknown, and emerging contaminants (KUECs) that can pose chronic risks and need to be removed. Conventional chemical-based drinking water treatment processes are not effective at removing DBPs or KUECs, and thus alternative approaches are necessary to minimize these risks by targeting the removal of DBP precursors and KUECs that are commonly found in water supplies. In this talk, we introduce the "Minus Approach," a novel approach to water treatment that mitigates KUECs and DBPs without compromising the safety of microbiological quality. The Minus Approach aims to produce biologically stable water with minimal human health risk and significantly lower concentrations of KUECs and DBPs, while reducing the use of chemical treatments that may cause problems, in contrast to the conventional "Plus Approach." The Minus Approach avoids primary chemical-based coagulants, disinfectants, and advanced oxidation processes, and instead focuses on membrane-based physical separation techniques that can effectively remove DBP precursors, KUECs, and pathogens from the main water treatment stream. If needed, the concentrate can be treated separately. As a result, the Minus Approach allows for the mitigation of DBPs and KUECs, with smaller doses of secondary chemical disinfectants used to minimize microbial regrowth in distribution systems. Furthermore, the Minus Approach integrates with artificial intelligence to optimize and enhance its performance. Adopting the Minus Approach in water treatment can lead to improved sustainability performance, as it reduces reliance on chemical treatments and minimizes the presence of harmful contaminants in treated water.

About the Speaker

Dr. Yongsheng Chen is the Bonnie W. and Charles W. Moorman IV Professor in the School of Civil and Environmental Engineering at Georgia Institute of Technology and the Director of Nutrients Energy Water Center for AgTech. Professor Chen joined Georgia Institute of Technology in 2009. Professor Chen's research interests include environmental nanotechnology, membrane technology for sustainable energy and nutrients recovery, the Food-Energy-Water Nexus, and machine learning for sustainable membrane material screening, system integration, and process optimization. He has served as PI/Co-PI on sponsored research projects totaling more than \$41M, of which, \$18.5M has been, or is being, spent in his laboratory. He has over 206 published research articles. He has received numerous accolades, including the CAPEES/Nanova Lifetime Achievement Award, the American Chemical Society Editor's Award, the Georgia Institute of Technology's Sustained Research Award and Multidisciplinary Research Award, Sigma Xi Best Ph.D. Student Dissertation Advisor Award, and AEESP Outstanding Ph.D. Student Advisor Award. His work has been recognized by more than 20 national and international media outlets including Forbes, C&EN, AEESP, The Atlanta Journal-Constitution (AJC), and Water Environment Federation.

Note: Professor Yongsheng Chen's Distinguished Lecture is also part of the 2nd Greater Bay Area Symposium on Separation and Purification Technology (GBA-SPT 2023) and the 2nd Greater Bay Area Symposium on Membranes and Membrane Processes (GBA-MMP 2023), held online during 19-22 May 2023. Interested parties are welcome to attend the online symposium free of charge. For further information about the programme and meeting link for the symposium, please refer to <https://www.membest.hku.hk/conference>.



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