

## Environmental Lecture X

### Water Reuse - The Solution for Sustainable Water Resources Management from the Earth to Moon & Mars

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**Abstract:** Water scarcity poses a growing challenge in the Southwestern and Southern regions of the United States, including Texas. Long-term water supply availability has become a critical concern for water utilities, particularly as conventional water resources may not suffice to support future population and economic growth. Direct potable reuse (DPR) of treated wastewater stands out as a key solution, despite encountering various challenges such as ensuring safety and garnering public acceptance of purified water. At Texas State University, a pilot-scale advanced water purification (AWP) system capable of processing 1.5 gallons per minute was designed, constructed, and tested in January–December 2022. Subsequently, in January 2023, the system was deployed at the City of San Marcos Wastewater Treatment Plant. Our efforts have focused on: (1) testing several online instruments for detecting pathogens and disinfection byproducts using the AWP system, (2) investigating the occurrence of taste, odor, and appearance-related parameters in reclaimed water and their mitigation, and (3) using excess urban stormwater to augment reclaimed water. By reusing treated wastewater within our community, we can reduce reliance on conventional water resources for water supply, while minimizing the environmental discharge of pollutants. By implementing advanced treatment and sensor technologies in DPR, we will be able to achieve truly circular water system. We are also exploring the possibility of extending our research to space exploration and colonization, such as the Controlled Ecological Life Support System (CELSS), where safe and efficient water recycling will be critical. In environments like the Moon or Mars, with minimal native water sources, water reuse is vital for sustaining life, mirroring the near-total water recycling systems used on the International Space Station.

**Bio:** Dr. Ikehata is an Assistant Professor in the Ingram School of Engineering, Texas State University, San Marcos, TX. He joined Texas State as one of four founding members of the new Civil Engineering Program in July 2019. Dr. Ikehata received his PhD in Civil and Environmental Engineering from the University of Alberta in 2003. He has 20 years of experience in water quality and treatment research and engineering. His current research centers around the use of alternative water resources including brackish water, reclaimed water, and stormwater for potable applications using advanced treatment and monitoring technologies, as well as the taste, odor, and appearance of drinking water, including purified wastewater. Dr. Ikehata has been a member of the ACS since 1999. He was the Chair for Orange County Local Section in 2019 and Program Co-Chair for 2015 Western Regional Meeting in San Marcos, CA. He is currently a member of the ACS Committee on Environment and Sustainability (CES).

Any questions, contact [dr.Ronghong.lin@gmail.com](mailto:dr.Ronghong.lin@gmail.com)

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