Methane and Methanotrophs as a Waste-to-Resource Platform

Professor Jaewook Myung
Assistant Professor
Department of Civil and Environmental Engineering
Korea Advanced Institute of Science and Technology (KAIST)

Date: February 6th, 2020 (Thursday)
Time: 10:30 a.m. – 11:30 a.m.
Venue: Room 612B, Haking Wong Building, The University of Hong Kong

Abstract

Water, energy, materials, and food are essential for human well-being, poverty reduction, and sustainable development. Global projections indicate that the demand for these valuable essentials will increase significantly over the next decades due to rise in both human populations and standards of living worldwide. Viable steps need to be taken to renew our increasingly scarce essential resources. One option is to recover these valuable resources (water, energy, materials, fertilizers, food, etc.) from waste/wastewater. This research presents recent innovations to transform waste/wastewater treatment infrastructure into resource recovery centers by converting waste/wastewater into biogas methane and using methanotrophic bacteria to convert biogas methane into value-added products. First, methanotrophic bacteria enables removal nitrogen from wastewater and generation of nitrous oxide, a potential co-oxidant of biogas methane to increase energy production. In addition, these bacteria can produce biodegradable bioplastic, polyhydroxyalkanoates (PHAs), a sustainable alternative to petroleum-based plastics that can sequester carbon and help address climate change. Methanotrophs can also produce prebiotic fish/animal foods that improve fish/animal health and enhance growth. Altogether, use of methanotrophic bacteria in waste treatment infrastructure enables production of valuable bioproducts and low-cost recovery of water.

About the Speaker

Jaewook Myung is currently an Assistant Professor of Civil and Environmental Engineering at KAIST. Prior to joining KAIST, he was an Assistant Professor of Civil and Environmental Engineering and Fellow in the Hunt Institute for Engineering and Humanity of Southern Methodist University (SMU) from 2017 to 2019, and a postdoctoral research fellow at Pennsylvania State University from 2016 to 2017. He received a B.S. degree in Civil and Environmental Engineering at KAIST in 2011, and an M.S. and a Ph.D. degree in Civil and Environmental Engineering at Stanford University in 2014 and 2016, respectively. Jaewook’s interests are in converting water and waste treatment infrastructure that currently consume energy into systems that produce energy and recover resources. In this context, the Myung group is engaged in multiple projects in the nexus of water, energy, resources, materials, and environmental information.

- ALL ARE WELCOME -