From Biomolecules to Biofilms

Focused Seminar Series on Biomolecules and Biofilms

11 April - 16 June 2016, Level 5 Seminar Room, Enterprise Wing @ UTown, S'138602

Seminar 8: Investigating Microbial Abundance and Composition in Drinking Water Distribution via Analysis of Biofilm Communities Colonizing In-Pipe Sensors

Prof. Masaaki Kitajima

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Date: 16 June 2016, Thursday

Time: 4pm to 5pm

Venue: Perseverance Room, Enterprise Wing Level 5 @ UTown

Abstract

Biofilms occur universally on submerged surfaces in water distribution systems, which cause many problems in drinking water. Monitoring of biofilm development in drinking water pipes is essential to develop strategies for management of these problems; therefore, we carried out a pilot study to analyze biofilm communities colonizing in-pipe sensors of the WaterWiSe (**Water Wi**reless **Se**ntinel) system. Specifically, we investigated microbial abundance and composition in biofilms and local water using droplet digital polymerase chain reaction (ddPCR) and Illumina next-generation sequencing. Based on ddPCR, we found that ammonia-oxidizing bacteria (AOB), which are responsible for microbial ammonia oxidation, were highly abundant in our samples. The analysis of microbial composition based on 16S rRNA gene amplicon sequencing revealed that, within a water distribution network, there was clear dissimilarity in microbial community structure between two zones that had contrasting hydraulic water quality characteristics (water age, residual disinfectant levels, etc.). This study reveals the abundance and composition of microorganisms in an operational drinking water distribution system in Singapore. We also demonstrated that the WaterWiSe system allows us to carry out systematic investigations on microbial ecology and activities in water distribution via analysis of biofilm communities colonizing the in-pipe hydraulics/water quality sensors.

Biography

Masaaki Kitajima is an assistant professor at the Division of Environmental Engineering at Hokkaido University, Japan. Before he obtained his current position in March 2016, he worked at CENSAM as a Postdoctoral Associate from January 2014 and investigated biofilm development and microbial water quality in drinking water distribution systems. He received a Ph.D. in 2011 from the University of Tokyo, where he majored urban environmental engineering. His major research interest is environmental and public health microbiology, and he has more than 11 years experience in this research field.