



Environmental Engineering
UNIVERSITY OF COLORADO **BOULDER**

Spring 2018 Environmental Engineering Seminar Series

Title: Weakest Link in Water Quality Control: Drinking Water Biofilm in Premise Plumbing

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Date: Thursday, March 15th 2018

Time: 3:00 PM – 4:00 PM

Place: SEEC N124



Abstract

Indoor premise plumbing (PP) is the last part of the water distribution system that influences the water quality before the treated drinking water reaches customers at their taps. The PP pipelines have smaller diameters than those in other parts of the distribution systems, resulting in significantly higher loss of residual disinfectant and higher biomass growth. Depending on building design and customers' usage, water in PP could stay unused for days, leading to quality deterioration through the reactions between disinfectants with the biofilms and the pipe materials. Diminishing concentrations of disinfectants throughout the distribution system and especially in PP eliminate the safeguard against pathogen exposure for customers at their taps. To overcome the challenge of maintaining water quality at the taps for end-users, we conducted a systematic study to answer the following questions: 1) how does drinking water chemical composition, including residual disinfectants and anti-scalant and anti-corrosion agents, influence the structure and mechanical properties of biofilm grown in PP, 2) under what conditions will biofilm slough and pathogens be released, 3) what controls the formation of disinfection byproducts by the reaction between the residual disinfectant and the biofilms, 4) what controls the disruption of biofilm by a novel technology of three-dimensional printed microplasma jet array. We developed novel tools of imaging and image processing to characterize the physical and mechanical properties of complex drinking water biofilms in their native environments and links these properties to the influence of biofilms on water quality.

Dr Helen Nguyen is currently an associate professor of environmental engineering and a faculty affiliate with Institute for Genomic Biology at University of Illinois at Urbana-Champaign. She holds a Ph.D. in Environmental Engineering from Johns Hopkins University. Prior to joining University of Illinois, she was a Gaylord Donnelley Environmental Postdoctoral Fellow at Yale University. Her research group focuses on waterborne pathogens for global water and food safety. Besides a number of projects based in the US, her group is conducting research in developing countries on human resilience to waterborne infectious disease outbreak related to extreme natural events. Her group has published on a wide range of topics related to human health impact of water reuse, food safety, and pathogens in drinking water distribution systems. She has led multiple interdisciplinary projects funded by the National Science Foundation, the Environmental Protection Agency, and the US Department of Agriculture. She is currently leading three interdisciplinary projects on human health impacts of on-farm reuse of wastewater in small rural communities and urban hydroponic farming in the US and in Israel. Dr. Nguyen is the recipient of the 2006 AEESP/CH2M Hill Outstanding Dissertation Award, 2010 NSF CAREER award, 2010 ASCE/EWB Sustainable Development Award, 2012 and 2016 University of Illinois College of Engineering Dean's Award for Research Excellence. She was also awarded with a Fulbright Fellowship to Israel and a Visiting Fellowship from Japanese Society for the Promotion of Science. She is currently serving on Editorial Advisory Board for Environmental Science & Technology.

If you have any questions, please contact Professor Fernando Rosario-Ortiz, Fernando.Rosario@colorado.edu