

CEE 595AG Seminar

Environmental Engineering and Science

Program Seminar

Impact of chloramination on the development of biofilms in an environment simulating drinking water distribution systems

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Drinking water distribution systems (DWDS) deliver water from water treatment plants to end users. The inner surfaces of these systems provide vast areas for microorganisms to attach and form biofilms. These biofilms are composed of multiple species, and cannot be eliminated by residual disinfectants. However, the effect of disinfection on microbial communities in multispecies biofilms is not well understood. This study aims to determine the long-term impact of disinfection on biofilm development. A lab-scale reactor with groundwater supply, constant shear, and PVC surfaces was set up to grow biofilms. We examined and compared the development of biofilm architecture and microbial community with or without the influence of monochloramine. Confocal laser scanning microscopy and image analysis indicated that chloramination could lead to 81.4-83.5% and 86.3-95.6% reduction in biofilm biomass and thickness, respectively, but could not eliminate biofilm growth. Results of 16S rRNA gene-based terminal restriction fragment length polymorphism analysis indicated that microbial community structures between chloraminated and non-chloraminated biofilms exhibited different trends in community development. 16S rRNA pyrosequencing analysis further revealed that chloramination could select members of *Actinobacteria* and *Acidobacteria* as the dominant populations, whereas natural development led to the selection of members of *Nitrospirae* and *Bacteroidetes* as dominant biofilm populations. Overall, chloramination treatment could alter the growth of multi-species biofilms on PVC surface, shape the biofilm architecture, and select a certain microbial community that can survive or proliferate under chloramination.

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12:00 – 1:00 p.m.

2312 Newmark

Everyone is welcome

Refreshments immediately following in the lobby area