Contaminants of Emerging Concern in “Unimpacted” Urban Environments and Their Degradation by Light-Driven Engineered Processes

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Abstract

Contaminants of emerging concern (CECs), such as pharmaceuticals and personal care products, are present in the aquatic environment and represent potential threats to both human and ecological health. Background information on CECs will be framed using our measurements in the Chesapeake Bay. The first part of the talk will focus on the occurrence of CECs in an urban watershed that is not directly impacted by expected sources, such as wastewater treatment plants or animal feeding operations. We hypothesize that CECs are introduced to this watershed through leaking sewers. Given the detection of CECs in the aquatic environment, a need exists to improve CEC removal during wastewater treatment. The second part of this talk will focus on the transformation of antibiotics by light-driven processes. Most antibiotics derive from a baseline pharmacophore substituted with different functional groups. We hypothesized that phototransformation of antibiotics results in changes at the functional groups and not the pharmacophore, effectively producing other antibiotics. These findings highlight the need for continued investigation both upstream and downstream of wastewater treatment plants to fully understand the occurrence, fate, transport, and toxicity of CECs in the aquatic environment.

Background

Dr. Lee Blaney is an Associate Professor in the Department of Chemical, Biochemical, and Environmental Engineering at the University of Maryland Baltimore County (UMBC). At UMBC, Lee has established a research program focused on (1) the occurrence, fate, transport, and toxicity of contaminants of emerging concern in natural and engineered systems and (2) development of innovative technologies for resource recovery from agricultural and municipal waste. He is the recipient of the ES&T James J. Morgan Early Career Award, the NSF Career Award, and the AEESP Award for Outstanding Teaching in Environmental Engineering and Science. Lee is also a proud alumnus of UT Austin – he completed his PhD in 2011 with Drs. Lynn Katz and Desmond Lawler.