The University of Arizona
Chemical and Environmental Engineering Department – Seminar
"Light-based materials and aquatic environmental processes towards sustainable water treatment"

Kyle Moor, MPhil, PhD
Postdoctoral Research Fellow
Department of Environmental Systems Science, ETH Zürich

ABSTRACT

Sunlight is a major energy input into the global environment, which drives numerous photochemical processes. Considerable research efforts have gone into developing light-harvesting materials to convert the abundant solar energy into electricity, heat, and chemicals for renewable energy production. Such materials also have applications in water treatment technologies, wherein captured light is utilized to drive thermal separation processes, degrade pollutants, and inactivate microorganisms, offering a sustainable route to clean water production. Along with this, sunlight plays a critical role in pollutant transformation and microbial photoinactivation in natural waters.

This seminar will revolve around research findings on both light-based materials and aquatic environmental processes, towards advancing sustainable water treatment. Research efforts to develop fullerene materials for singlet oxygen-based solar disinfection technologies will be discussed with an emphasis on the approaches employed to overcome the challenge of using hydrophobic fullerene in aquatic systems. On the theme of environmental processes, ongoing work will be covered on probing the photochemical properties of triplet excited dissolved organic matter (^{3}DOM*), a reactive intermediate that is responsible for pollutant degradation in natural waters. Time-resolved singlet oxygen phosphorescence, a technique developed to indirectly monitor ^{3}DOM*, will be described along with how this technique fosters a deeper understanding of DOM photochemistry and pollutant fate in the environment.

BIOSKETCH

Dr. Kyle Moor holds a Bachelor of Science degree in Chemistry from Virginia Tech and an M.Phil. and Ph.D. in Chemical and Environmental Engineering from Yale University. Throughout his Ph.D., he worked on developing innovative materials for photon-enabled water disinfection technologies. He is currently an ETH Postdoctoral Research Fellow in the Institute of Biogeochemistry and Pollutant Dynamics at ETH Zürich, where he utilizes new spectroscopic techniques to study light-mediated pollutant degradation processes in natural waters. His research interests focus on photonic processes in both engineered and natural systems towards developing novel approaches for sustainable water production.

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