

Colloquium Notice

Alexander Greer

Brooklyn College

Physics of "phase separation" of reactive oxygen species: aspects bordering on water disinfection and tumor eradication

A phase-separated approach to reactive oxygen species that employs a liquid at a solid/liquid or solid/gas/liquid interface has been developed. Biphasic and triphasic photosensitizer systems contain regions that are controllably dry, partly wetted, and/or fully wetted. The talk will focus on a superhydrophobic surface fabricated by embedding silicon phthalocyanine sensitizing particles to specific locations on 3-D printed polydimethylsiloxane (PDMS) posts. In the presence of visible light and oxygen, singlet oxygen is formed on the superhydrophobic surface and reacts with an anthracene compound within a freestanding water droplet to produce an endoperoxide. The results indicate that the superhydrophobic sensitizer surface offers a unique system to study reactive singlet oxygen ($^1\text{O}_2$) transfer routes where a balance of gas and liquid contributions of $^1\text{O}_2$ is tunable within the same superhydrophobic surface. Two microphotoreactor devices will also be described. In all, these systems physically isolate the photosensitizer from the solution which may be of practical importance for delivering singlet oxygen for water purification and medical devices.

1. D. Aebisher; D. Bartusik; Y. Liu; Y. Zhao; M. Barahman; Q. Xu; A. M. Lyons; A. Greer "Superhydrophobic Photosensitizers. Mechanistic Studies of $^1\text{O}_2$ Generation in the Plastron and Solid/Liquid Droplet Interface" *J. Am. Chem. Soc.* **2013**, *135*, 18990-18998.
2. Y. Zhao; Y. Liu; Q. Xu; M. Barahman; D. Bartusik; A. Greer; A. M. Lyons "Singlet Oxygen Generation on Porous Superhydrophobic Surfaces: Effect of Gas Flow and Sensitizer Wetting on Trapping Efficiency" *J. Phys. Chem. A* **2014**, *118*, 10364-10371.
3. D. Bartusik; D. Aebisher; A. M. Lyons; A. Greer "Bacterial Inactivation by a Singlet Oxygen Bubbler: Identifying Factors Controlling the Toxicity of $^1\text{O}_2$ Bubbles" *Environ. Sci. Technol.* **2012**, *46*, 12098-12104.
4. D. Bartusik; D. Aebisher; B. Ghafari; A. M. Lyons; A. Greer "Generating Singlet Oxygen Bubbles: A New Mechanism for Gas-Liquid Oxidations in Water" *Langmuir* **2012**, *28*, 3053-3060.
5. R. Choudhury; A. Greer "Synergism Between Airborne Singlet Oxygen and a Trisubstituted Olefin Sulfonate for the Inactivation of Bacteria" *Langmuir* **2014**, *30*, 3599-3605.

Monday
April 13, 2015
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326

Physics Department of Queens College, 6530 Kissena Blvd, Queens, NY 11367 <https://physics.qc.cuny.edu>