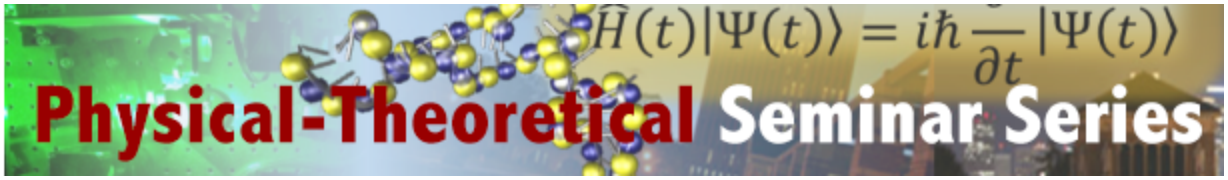

Monday, February 5, 2018, 12:30 pm
Seaver Science Library, Room 150
SSC Auditorium next to the library

Professor Veronica Vaida

Department of Chemistry
University of Colorado, Boulder

Molecular Complexity at Air-Water Environmental Interfaces

Sunlight-driven reactions of organic molecules contribute to the atmospheric processing of organic compounds, including the generation of molecular complexity via aqueous chemistry in planetary atmospheres including the contemporary and ancient Earth. In addition to bulk processes, the interfacial and heterogeneous chemistry that occurs at environmental water surfaces is a key source of atmospherically-relevant processing. Water-air interfaces provided at the sea surface and on aerosols are auspicious reaction environments, leading to the synthesis of more complex molecules. Here, we report on the robust photochemical mechanism by which α- keto acids react in aqueous solution to form organic radicals, which can recombine to form larger, more complex molecules. The oligomers formed are amphiphiles, many with two or three alkyl chains. The photoproducts generated from these alkyl α-keto acids are surface-active, and spontaneously self-assemble into monodisperse, spherical aggregates in photolysis. The aqueous photochemistry of α-keto acids also provides radical initiators for the polymerization of non-photoactive molecules. We will also discuss the effect of environmental reaction conditions, including oxygen content and solution pH, on the branching ratio of photochemical pathways. The photochemistry presented has consequences for processing organics in the contemporary atmosphere of Earth as well as generating biopolymers necessary for life in the context of prebiotic chemistry.

Supplemental Reading:
"pH Dependence of the Aqueous Photochemistry of α-Keto Acids" Rebecca J. Rapf, Michael R. Dooley, Keaten Kappers, Russell J. Perkins, Veronica Vaida *J. Phys. Chem A* **121**, 8368-8379 (2017) DOI:10.1021/acs.jpca.7b08192

"In situ observation of peptide bond formation at the water-air interface" Griffith, Elizabeth C., Vaida, Veronica *Proc. Natn. Acad. Sci* 109(39) 15697-15701 (2012)
www.pnas.org/cgi/doi/10.1073/pnas.1210029109

Hosted by Professor Anna Krylov
The scientific community is invited

USC Department of Chemistry
chem.usc.edu