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Interfacial Oxidation of Phenols

ABSTRACT:

Anthropogenic aerosols originated from combustion and biomass burning (C&BB) emissions play a major role in climate, visibility and air quality. This talk will discuss important interfacial oxidations of a series of substituted phenols, molecular probes of C&BB emissions, driven by gaseous O_3 , and HO and NO_3 radicals. We propose that interfaces catalyze different reactions from those typical in the gas-phase or bulk water based on a combination of analytical techniques. For example, the attack of OH radicals produces polyhydroxylated aromatic compounds, and induces the generation of coupling products at the air-solid interface. At the air-water interface, oxocarboxylic acids and dicarboxylic acids of low molecular weight are formed by direct ozonolysis of the polyhydroxylated aromatic compounds. The talk will introduce other previously unidentified mechanisms of generation of complex chromophoric organic matter in the troposphere, which are based on systematic studies at the air-water interface and the air-solid interface. The proposed pathways can contribute precursors to aqueous secondary organic aerosol formation.

BIO:

Marcelo I. Guzman is an Associate Professor of Chemistry and the Principal Investigator of the Environmental Chemistry Laboratory at the University of Kentucky since 2010. In 2013, he received a NSF CAREER award. He holds a Licentiate in Chemistry degree from National University of Tucuman, Argentina (2000). He received undergraduate and graduate research fellowships from the Research Council of the National University of Tucuman (1999 to 2002), to perform research in various projects in the Organic Chemistry Department. In 2001, he was awarded The Argentine Chemical Society award and the National Research Council of Argentina (CONICET) offered him a fellowship as the top ranked Chemistry graduate. In 2002, he was an Andrew W. Mellon Fellow at the Metropolitan Museum of Art (New York) working on Paper and Photograph Conservation in the Sherman Fairchild Center. He earned his Ph.D. at the California Institute of Technology (Caltech, 2007) working on ice chemistry. For his postdoctoral experience he joined the Harvard Origins of Life Initiative in 2007 as an Origins Fellow.