



Online LTP Seminar
September 7, 2021, 9:00 am EDT

Plasma-Liquid Interactions in the Presence of Organic Matter

Katharina Stapelmann

North Carolina State University

Plasmas in contact with liquids have been studied extensively in “clean” environments with deionized or ultrapure water as liquid. Studying plasma-liquid interactions in the context of life science applications, e.g., plasma medicine or plasma agriculture, often involves the presence of organic matter that may become part of the chemistry. Organic matter can play a passive role by offering a target for reactions, thus modifying the cocktail of reactive species present. Living organic matter can also play an active role by neutralizing reactive species or by producing their own chemistry in response to the plasma treatment.

Here, we will explore the liquid chemistry on the example of hydrogen peroxide and its precursors O and OH, in the presence of OH scavengers. Further, the model biological sample cysteine is used in conjunction with heavy water (H_2^{18}O) to explore the origin, generation, and transport of reactive species from the gas phase to the liquid to a biological sample. Finally, liquid chemistry is investigated in the presence of two leukemic cancer cells, the myeloid THP-1 and the lymphoid Jurkat cells.

Short Bio



Katharina Stapelmann is an assistant professor of nuclear engineering at North Carolina State University. She received her Ph.D. in electrical engineering from Ruhr University Bochum, Germany, in 2013, where she continued as PostDoc (2014) and assistant professor of electrical engineering (2015-2017) before she joined NC State in 2017. Stapelmann's research interests lie in the experimental investigation of generation and transport of reactive species for life science applications, e.g. plasma medicine and plasma agriculture. Her work has been funded by the National Science Foundation, the US Department of Energy, the US Department of Agriculture, and North Carolina State University's Game-Changing Research Incentive Program for Plant Sciences Initiative. Stapelmann is Mercator Fellow (DFG), speaker of the board of trustees of the German national center of plasma medicine (NZPM), and serves on the International Advisory Board of the Journal *Plasma Processes and Polymers*.