

COMBUSTION WEBINAR

Ozone-initiated oxidation at extreme low-temperatures

Speaker: Dr. Nils Hansen, Sandia National Laboratories

Time: May 22nd 2021

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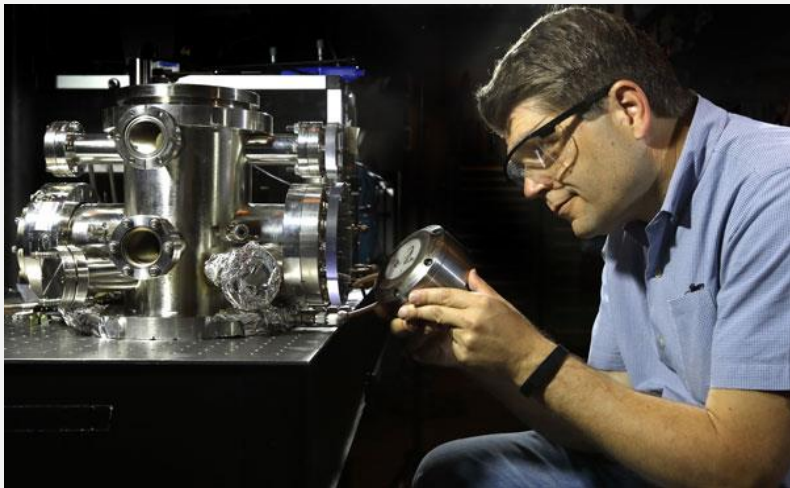
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COMBUSTION
WEBINAR



Abstract: Ozonolysis, the oxidation of unsaturated hydrocarbons by ozone (O_3), is a vital research area of atmospheric chemistry and has been extensively studied for almost a century, particularly at conditions relevant to atmospheric hydrocarbon oxidation and aerosol formation. Beyond atmospheric chemistry research, ozone reactions with hydrocarbon species have also recently attracted significant interest in fundamental low-temperature combustion studies. The motivation for these fundamental investigations stems from the rise of non-equilibrium plasma-assisted combustion techniques and chemically controlled engine designs.

The aim of this talk is to review recent progress in the detection and quantification of elusive key intermediates and to discuss the complex reaction networks of hydroperoxide species and Criegee intermediates. Specifically, it will be discussed that successive addition reactions of Criegee intermediates lead to significant molecular weight growth and the formation of highly oxygenated species that reportedly have been found also in atmospheric secondary organic aerosols. Furthermore, experimental evidence will be highlighted for a previously unexplored oxidation regime that occurs after ozone addition at extreme low temperatures. Experimental and theoretical evidence is provided that the chemistry in this newly observed regime is dominated by hydroperoxide chemistry.

Biography: Dr. Nils Hansen is a physical chemist at the Combustion Research Facility of the Sandia National Laboratories in Livermore, CA, USA, a Principal Investigator at Sandia's newly funded Plasma Research Facility, and currently the Acting Manager of Sandia's "Gas-Phase Chemical Physics Department". He received his PhD in Physical Chemistry at the Christian-Albrechts-Universität Kiel, Germany, in 2000. In 2004, he joined Sandia National Laboratories in Livermore, CA, USA.

Dr. Hansen has co-authored more than 130 publications in peer-reviewed international journals. He was elected a "Fellow of the Combustion Institute" in 2019 and a recently received "Helmholtz International Fellow" award. He is a member of the editorial board for the "Proceedings of the Combustion Institute", the organizer of the biennial "International Workshop on Flame Chemistry" series and was named Program Chair for the 39th International Symposium on Combustion that will be held in 2022 in Vancouver, Canada.

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