

COMBUSTION WEBINAR

Influence of Functional Groups on Low-Temperature Combustion Chemistry of Biofuels

Speaker: Dr. Brandon Rotavera, University of Georgia

Time: Mar. 6th 2021

10 am EST; 4 pm Paris; 11 pm Beijing.

Zoom Meeting ID: 959 5515 8623

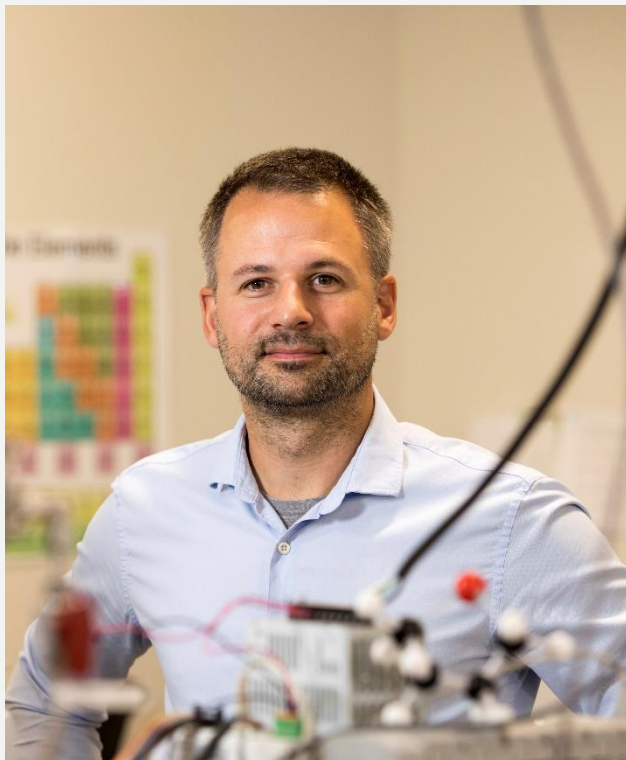
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Biography: Dr. Brandon Rotavera is an Assistant Professor at the University of Georgia (UGA), with appointments in both the Department of Chemistry and the College of Engineering. Prior to his academic appointments in 2016, Dr. Rotavera held a Postdoctoral Appointee position at the Combustion Research Facility of Sandia National Lab. He earned a Ph.D. in Interdisciplinary Engineering, focusing on physical chemistry and mechanical engineering, from Texas A&M University in 2012, during which he was also a visiting Research Scholar at the French National Center for Scientific Research (CNRS) in Orléans, France. Dr. Rotavera is a recipient of the NSF CAREER award and other projects related to gas-phase physical chemistry are supported by the U.S. DOE and the NSF. At UGA, his work concerns gas-phase reaction mechanisms of biofuels and hydrocarbons at high-pressure and low-temperature conditions using jet-stirred reactor experiments and quantum chemical modeling.

Abstract: In order to integrate new biofuels into existing combustion systems, and to optimize the design of next-generation combustion systems, understanding connections between molecular structure and ignition below 1000 K remains a priority that is addressed in part using chemical kinetics modeling. The development of predictive models relies on detailed information, derived from experiment and theory, on molecular structure and chemical reactivity, both of which influence the balance of chain reactions occurring during combustion – propagation, termination, and branching. The presentation provides a review on the current state of knowledge on low-temperature oxidation of biofuels, including initiation steps, peroxy radical reactions, QOOH-mediated reactions, and chain-branching chemistry. Two specific types of biofuels that are covered are alcohols and cyclic ethers. In addition to the review material, areas of research that are needed to address remaining fundamental questions are discussed.

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