DEPARTMENT OF PHYSICS AND ASTRONOMY

COLLOQUIUM IN-PERSON ONLY EVENT

Gas-Phase Combustion Chemistry: Elementary Reactions Governing Complex Systems

Brandon Rotavera

College of Engineering and Department of Chemistry

University of Georgia

Despite electrification efforts, the U. S. Energy Information Agency (EIA) projects that, for the foreseeable future, liquid hydrocarbons and biofuels will continue to provide greater than 95% of transportation energy. Moreover, outside of the U.S., the European Union has set a target of 27% for renewable energy in the transportation sector, as proposed in the 2030 Framework for Climate and Energy, which is stated to be met only by partially or completely replacing petroleum-derived fuels with biofuels. Building on the recognition that combustion-derived energy is to remain critical to the transportation sector, continued development of advanced combustion technologies plays a meaningful role in sustainably meeting rising energy demands and is aided in part by incorporating oxygenated biofuels.

Underpinning this effort is the need to understand fundamental chemistry of species with functional groups, such as ethers and ketones, for the purpose of enabling predictive modeling capabilities that accelerate the creation of new technologies. Central to that aim is employing gas-phase combustion experiments coupled with isomer-resolved detection of intermediates to enable a fundamental understanding of reaction mechanisms – elementary steps that comprise a broader network of chemical reactions.

The seminar discusses chemical kinetics in the context of combustion, the reaction networks that underlie ignition, and reasons why understanding the connections is important to sustainable transportation energy initiatives. In addition, experimental techniques using vacuum ultraviolet absorption spectroscopy for resolving constitutional isomers and stereoisomers, and related machine learning methods to infer molecular structure from absorption spectra is covered.

Thursday, April 10, at 3:55 PM

IN-PERSON EVENT ROOM 202

Local Contact: Dr. Tho Nguyen, ngtho@uga.edu