

Boulder Fluid and Thermal Sciences Seminar Series



Tuesday, April 23, 2019

3:30pm-4:30pm (refreshments at 3:15pm)

Clark Conference Room ECAD 109 in the Engineering Center

University of Colorado, Boulder

Isomer-Resolved Probing of Complex Systems of Reactions

Nils Hansen

Combustion Research Facility, Sandia National Laboratories

This talk summarizes our recent advances towards a detailed understanding of the low- and high-temperature chemistry of combustion through experiments using idealized laboratory-scale model flames and jet-stirred reactors. Specifically, the talk will highlight four distinct aspects of our work: (a) Aromatics formation in hydrocarbon flames with a focus on the significance of various pathways to form aromatics, especially larger polycyclic aromatic hydrocarbons (PAHs). (b) The investigation of two-dimensional temperature field around a quartz sampling probe using X-ray fluorescence spectroscopy and the impact of combustion chemistry modeling. (c) The detection, identification, and quantification of elusive, peroxy intermediates during the low-temperature oxidation processes through an integrated experimental and theoretical approach. (d) The development and exploration of new experimental capabilities that can be applied for chemically detailed studies of the formation of PAHs and highly oxygenated intermediates.

Biography: Nils Hansen received his PhD in Physical Chemistry at the Christian-Albrechts-Universität Kiel, Germany, in 2000 under the guidance of Prof. F. Temps. He then worked with Prof. A. M. Wodtke as a postdoctoral researcher at the University of California Santa Barbara, USA, and as a staff member at the BASF AG, Ludwigshafen, Germany. In 2004, he joined Sandia National Laboratories in Livermore, CA, USA as a Principal Investigator in the “Flame Chemistry and Diagnostics” laboratory of the Combustion Research Facility. He has been a visiting researcher in the group of Kohse-Höinghaus in Bielefeld, Germany, in 2012. Hansen’s research focuses on unraveling the complexity of reaction networks by providing detailed insights into the fundamental chemistry of low-temperature oxidation and the formation of aromatic species in incomplete combustion processes. He has co-authored more than 100 publications in peer-reviewed international journals. For his work, he has received several awards, including a Feodor-Lynen-Fellowship of the Alexander von Humboldt-Foundation and Sandia’s Adams Award. Hansen served as a co-chair for the “Diagnostics Colloquium” for the 36th International Symposium on Combustion, Seoul, South Korea, is a member of the editorial board for the “Proceedings of the Combustion Institute” and is the organizer of the biannual “International Workshop on Flame Chemistry” series. He was elected a “Fellow of the Combustion Institute” in 2019.

