

COMBUSTION WEBINAR

Chemical kinetic and laminar flame studies for the era of renewable energy: two selected topics of ammonia combustion and battery fire mitigation

Speaker: Prof. Hisashi Nakamura, Tohoku University

Time: 11:00 ET, Sept 4th 2024 (8:00 PST; 17:00 Paris, 23:00 Beijing)

Zoom meeting link: <https://gatech.zoom.us/j/96560557165>

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WEBINAR



Biography: Prof. Hisashi Nakamura received his PhD degree in Engineering from Tohoku University in 2006. He became an Assistant Professor of Institute of Fluid Science, Tohoku University in 2007 and was promoted to an Associate Professor in 2015. He was a visiting researcher at Combustion Chemistry Centre, University of Galway (National University of Ireland, Galway at that time) for one year from Sep. 2011, and has been a visiting scholar at Turbomachinery Laboratory, Texas A&M University for several weeks each year from 2022 to 2024. His research interest includes combustion in the areas of laminar flames and chemical kinetics for hydrocarbons, low-carbon fuels, battery electrolytes, and refrigerants. His fundamental combustion research aims to contribute to zero carbon and zero fire accident in future energy systems. He has published over 80 peer-reviewed journal articles and their citations are more than 2000 in Scopus. He received the title of Distinguished Researcher of Tohoku University in 2020.

Abstract: We are now in the era of transition from fossil fuel-based energy to renewable energy. To compensate temporal and spatial supply-demand gaps of renewable energy sources, it is essential to store renewable energy as low-carbon fuels or electricity in batteries. The role of combustion research is extremely important to adapting existing combustion systems to low-carbon fuels and to improving the fire safety of batteries whose energy and power densities increase. The presentation introduces two recent studies in my group: ammonia combustion and battery fire mitigation. For ammonia combustion, model validation using fundamental combustion properties obtained in my group as well as literature is introduced. The presentation also includes applications of ammonia reaction models to practical combustion CFD. For battery fire mitigation, the development of a surrogate reaction model of electrolytes used in lithium-ion batteries (LIBs) is introduced. The presentation also includes recent work on chemical kinetics of fire retardants which can be dissolved in LIB electrolytes.

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