COMBUSTION WEBINAR

The Importance of Combustion Science to Unravel Complex Large Outdoor Fire Processes

Speaker: Samuel L. Manzello, National Institute of Standards and Technology (NIST)

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Biography: Samuel L. Manzello obtained his PhD in Mechanical Engineering from the University of Illinois-Chicago and joined NIST in 2001 as an NRC Post-Doctoral Fellow. He has led investigations on microgravity combustion, droplet-surface interaction, soot formation, fire-structure interaction, and wildland-urban interface (WUI) fires. Dr. Manzello's research in droplet-surface interaction was featured in the journal Nature and his firebrand research was featured in the journal Science. Dr. Manzello has received many awards including a fellowship from the Japan Society for the Promotion of Science (JSPS), a NIST Individual Bronze Medal, the 2015 Harry C. Biggelstone Award from NFPA, the 2016 and 2020 Best Journal Paper Award from the Combustion Society of Japan, and the 2017 Samuel Wesley Stratton Award from NIST. He is currently Associate Editor of Fire Technology, Guest Editor for Combustion Science and Technology and Frontiers in Mechanical Engineering, and on the Editorial Advisory Board of the journal Fire and Materials and Fire Safety Journal. Additional service includes colloquium co-chair for Fire Research at the 37th and 38th International Combustion Symposium, convener of ISO TC92/WG14, and co-leader of the IAFSS permanent working group LOF&BE. At the invitation of Springer Nature, he served as Editor in Chief for the encyclopedia of wildland fires and wildland-urban interface (WUI) fires.

Abstract: Devastating large outdoor fires have been responsible for destruction of vast amounts of infrastructure and loss of human life. Wildland fires that spread into urban areas, known as wildland-urban interface (WUI) fires are capable of enormous destruction. It is important to distinguish WUI fires from wildland fires; WUI fires include the combustion of both vegetative and human-made fuels and occur where large population centers exist whereas wildland fires include the combustion of vegetative fuels and occur in uninhabited areas. The rise of densely populated urban areas has also seen the development of large urban fires. In addition, growing informal settlement communities continues to result in large outdoor fires capable of great destruction. As a wildland fire reaches an urban area, structure-to-structure flame spread processes will occur via similar mechanisms as those in informal settlement fires and urban fires. At first glance, the complex ignition, flame spread processes, and degree of gaseous and particulate emissions appear daunting during these large-scale destructive events since many of the detailed physics of these processes have yet to be fully revealed. In turn, this is a major barrier to developing computational methods to be able to predict and understand large outdoor processes. In this webinar, important areas in need of physical understanding that are capable of great research impact will be presented. As just one example, firebrand combustion processes will be presented in detail. The webinar will close on progress in ISO TC92/WG14 (Large Outdoor Fires and the Built Environment Working Group) to develop harmonized test standards to begin to address this growing global problem.

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