



ME Department Seminar

The Intriguing Mystery of Soot Formation: Developing the Tools to Solve It



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Soot is notorious for the substantial negative impact it has on human health, air quality, and global climate. Soot emissions into the atmosphere are a result of incomplete combustion of hydrocarbon fuels, and there is considerable interest in developing better approaches for controlling these emissions. Despite major advances in the understanding of soot chemistry over the past several decades, however, there are still a number of outstanding questions related to soot formation and physical and chemical evolution during combustion. These gaps in understanding are largely attributable to the complexity of the chemical and physical system combined with a paucity of diagnostic techniques available for probing soot non-invasively and under a wide range of combustion conditions. This talk will describe some significant gaps in the current understanding of soot chemistry, the parameters that need to be measured to close these gaps, and some approaches we're taking to make these measurements.

Hope A. Michelsen has been a technical staff member in the Combustion Research Facility at Sandia National Laboratories since 1999. Her research program focuses on developing and using optical techniques for studying the chemistry of combustion-generated particles inside the combustor and their impact on climate when released to the atmosphere. Her research experience includes gas-surface scattering experiments, atmospheric modeling, soot-formation studies, combustion-diagnostics development, atmospheric black-carbon measurements, and greenhouse-gas source attribution. She received an A.B. in Chemistry from Dartmouth College and a Ph.D. in Chemistry with a minor in Physics from Stanford University. She completed an NSF postdoctoral fellowship at Harvard University and worked at Atmospheric and Environmental Research, Inc. before joining the technical staff at Sandia. She completed an NSF postdoctoral fellowship at Harvard University and worked at Atmospheric and Environmental Research, Inc. before joining the technical staff at Sandia