**Title:**

**Production, Transport and Deposition of Smoke in Fire Research**

**Abstract:**

This presentation is an overview of methods used for predicting and measuring smoke (soot and smolder smoke) emitted from fires. Understanding smoke dynamics, including generation, coagulation, transport, and deposition, is key to improving life safety predictions, such as smoke visibility and smoke detector activation, and important in applications such as fire forensics and mitigating the release of hazardous materials. In fire modeling tools, such as NIST’s Fire Dynamics Simulator (FDS), sub-models have been implemented for general aerosol transport, deposition, and coagulation, but their usefulness may be limited in practice. Users must specify the fire’s smoke yield and particle size(s), and the most appropriate size for fractal-shaped soot particles varies depending on the coagulation or deposition phenomena of interest. Our research group has been working to validate computational models for thermophoretic deposition, gravitational settling, aging (coagulation), and turbulent deposition. We have designed experiments to isolate transport mechanisms, employed state-of-the-art particle measurement methods and developed new methods to quantify soot deposition, and compared the measurements to FDS predictions. Future work in model validation is still needed, especially in the areas of soot coagulation and turbulent deposition, to improve overall predictions of the fate of smoke from fires.

**Bio:**

Dr. Amy Mensch is a mechanical engineer in the Engineered Fire Safety Group of the Fire Research Division at the National Institute of Standards and Technology (NIST). Dr. Mensch obtained her Ph.D. in mechanical engineering in 2015 from Penn State University, where she researched heat transfer in gas turbine applications and studied the thermal effects of contaminant deposition and cooling geometry. She obtained her M.S. in mechanical engineering, also from Penn State, with her thesis on the sooting propensity of gas turbine surrogate fuels. Prior to starting her doctoral degree, she worked in the Fire Fighting Technology Group at NIST, when she investigated the thermal performance of respirator facepieces. Dr. Mensch's current research interests are in soot deposition, fire and smoke detection, kitchen ignition prevention, and ember thermal characterization.