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## Novel Aerosol Measurement Techniques for Energy and Environmental Applications

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**Abstract:** Accumulating evidence suggests that the global climate is changing as a result of human activities, where fossil fuel combustion is a dominant contributor. To mitigate this problem, we need to make rapid progress in developing new fossil fuel combustion technologies and manufacturing advanced materials for sustainable energy utilization. In order to control the particle emission from fossil fuel combustion and engineer the functionality of nanoparticles, a thorough understanding of aerosol formation and growth dynamics is needed. This requires the development of novel techniques for quantifying the characteristics of aerosols. In this presentation, I will introduce two novel aerosol measurement techniques that fulfill these requirements by achieving a higher resolution of incipient particle measurement and a faster response of transient aerosol quantification. First, a high-resolution differential mobility analyzer was used to measure particles below 3 nm with a significantly enhanced accuracy. It was applied to study the detailed formation mechanisms of combustion-generated particles and optimize nanomaterials' performance. Second, a fast-integrated mobility spectrometer was developed for high-speed aerosol size distribution measurements. It was deployed onboard research aircraft to study the interaction between aerosol, cloud, and regional climate. I will conclude my talk with discussions on the application of these novel techniques in broader energy and environmental issues, such as synthesizing functional nanoparticles using combustion and analyzing the health effects of aerosols.

**Biographical Sketch:** Yang Wang is an Assistant Professor in the Department of Chemical, Environmental and Materials Engineering at the University of Miami. He obtained his Ph.D. from the Department of Energy, Environmental and Chemical Engineering at Washington University in St. Louis in 2017 and his B.S. degree from the Department of Thermal Engineering at Tsinghua University in 2012. Between 2017 and 2019, he was a postdoctoral research associate at Brookhaven National Laboratory. From 2019 to 2022, he was an Assistant Professor in the Department of Civil, Architectural and Environmental Engineering at Missouri University of Science and Technology. His research focuses on aerosol instrumentation, high-temperature aerosol measurement, and functional nanoparticle synthesis. He worked on a fast-integrated mobility spectrometer (FIMS) that measures aerosol size distributions every 1 s and high-resolution differential mobility analyzers (HR-DMAs) that measure particles with sizes down to 1 nm. Yang has authored and co-authored 55 peer-reviewed publications and is the Outstanding Reviewer of the journals including *Aerosol Science and Technology* and *Journal of Aerosol Science*. He is the recipient of the GAeF PhD Award during the 2019 European Aerosol Conference.

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