

# Rapid Measurements of Aerosol Size Distribution and Hygroscopic Growth with a Fast Integrated Mobility Spectrometer (FIMS)

**Prof. Yang Wang**  
Civil, Arch & Environ Engr.  
Missouri S&T



## Chemistry Seminar on Aerosol

**4:00 p.m.**

**Monday**

**November 2**

**G3 Schrenk Hall**

**This is an in-person seminar to be held in presence of live audience.**

**The seminar will be simultaneously live telecast via Zoom.**

**Please contact [choudhurya@mst.edu](mailto:choudhurya@mst.edu) for the zoom link.**

MISSOURI  
**S&T**

**Abstract:** Aerosol size distribution and hygroscopicity are among key parameters in determining the impact of atmospheric aerosols on global radiation and climate change. In situ submicron aerosol size distribution measurements commonly involve a scanning mobility particle sizer (SMPS). The SMPS scanning time is in the scale of minutes, which is often too slow to capture the variation of aerosol size distribution, such as for aerosols formed via nucleation processes or measurements onboard research aircraft. To solve this problem, a Fast Integrated Mobility Spectrometer (FIMS) based on image processing was developed for rapid measurements of aerosol size distributions from 10 to 600 nm. The parallel comparison between the FIMS and SMPS demonstrated excellent agreement when measuring aerosols with various size spectra, but by simultaneously measuring aerosols with different sizes, the FIMS provides aerosol size spectra nearly 100 times faster than the SMPS. Recent deployment onboard research aircraft demonstrated that the FIMS is capable of measuring aerosol size distributions in 1s, thereby offering a great advantage in applications requiring high time resolution. Such a system reduced the time of measuring the hygroscopic properties of submicron aerosols (six sizes) to less than three minutes in total, with an error within 1%.

About the speaker: **Yang Wang** is an Assistant Professor in the Department of Civil, Architectural and Environmental Engineering at Missouri University of Science and Technology. He obtained his Ph.D. degree from the Department of Energy, Environmental and Chemical Engineering at Washington University in St. Louis in 2017, and 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. 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. He also evaluated and developed portable particle sensors for air quality monitoring. Yang has authored and co-authored 30 peer-reviewed publications and is the Outstanding Reviewer of the Journal of Aerosol Science. He is the recipient of the GAeF PhD Award during the 2019 European Aerosol Conference.