Aerosol and Particle Measurement Short Course
22-24 August 2022

TSI Lab Descriptions

Topic A: Transient Aerosols: Capturing Fast Size Distribution Changes
If your aerosols are changing quickly, can your instruments keep up? Transient aerosol dynamics presents a challenge to obtaining accurate data on particle size and concentration. Applications such as engine emissions, brake dust measurements, and some environmental studies face this difficulty. We will explore the importance of using an instrument that is suited to the task of measuring fast-changing aerosols by using TSI's Engine Exhaust Particle Measurement System (EEPMS). Aside from changing quickly, engine emissions aerosols sometimes need to be measured in the field. The second half of this lab will explore a portable instrument designed for tailpipe measurements, the Nanoparticle Emissions Tester (NPET).

Topic B: Submicron Aerosol Generation and Measurement
Submicron aerosol is an important area for aerosol-related work. These nano-scale particles are ubiquitous in ambient air; when intentionally created in a laboratory, they can be used to calibrate instruments. This lab session will explore both aspects: measuring what's out there, and using them for a specific purpose. Specifically, this lab will feature TSI's Ultrafine Monitoring solution, which includes a sampling system, SMPS, standalone CPC, and relative humidity sensor. Designed for compliance with a pair of European standards, the instruments comprising this solution are useful for measuring ultrafines in the atmosphere in any setting. On the laboratory front, we will generate nano-scale aerosol for use in calibrating instruments.

Topic C: Supermicron Aerosol Generation and Measurement
This laboratory session will focus on supermicron (greater than about a micron) aerosol generation and sizing. Two aerosol generators will be featured: a dust generator that creates polydisperse aerosol from powders, and a monodisperse aerosol generator (FMAG) that creates monodisperse particles from liquid solutions. The particles coming from these generators will be characterized by several different particle sizers: the Aerodynamic Particle Sizer (APS), the Optical Particle Sizer (OPS), and the DustTrak DRX. Measurements made by each of these instruments will be compared and discussed.

Lab D: Filtration: Filter Testing Concepts and Recommended Practices
Air filters are tested by generating particles and measuring concentrations upstream and downstream of a filter. The choice of particle type (material and size distribution) as well as detector type are major factors that influence the test results.
During this lab we will discuss a number of different sensors that can be used for testing air filters. We will feature several automated testers that use different aerosols, detectors, and other features to meet the needs of different filter testing applications.