

### ***PP1.3.6 ISO A2 Fine Dust Dispersivity Measurement Using Shadowgraph Technique***

Seungkoo Kang<sup>1</sup>, Wing Lai<sup>2</sup>, Sheng-Chieh (Shawn) Chen<sup>1</sup>, David Pui<sup>1</sup>

<sup>1</sup>University of Minnesota, <sup>2</sup>TSI Incorporated

For the measurement of particle size distribution generated by dust dispersers in the application of filter tests, real-time sampling instruments are normally applied. However, dust size distributions from the same generator can be altered by different sizing instruments. This is mainly because of the different measurement principles, the different sizing range of the instruments, and the particle loss during the sampling.

In this study, noninvasive backlit shadowgraph method (Direct Image Particle Analysis, DIPA) was employed to measure the ISO A2 fine dust size distribution larger than 1  $\mu\text{m}$ . The DIPA measurement can measure the size distribution of the particles regardless of the dispersion methods and the types of dusts without transport losses. Furthermore, the images taken for the re-suspended dusts provide better morphology information than the embodied equilibrium optical or dynamic diameter by the real-time instruments.

The DIPA system is composed of a 8 Mpixel CCD camera equipped with 28x magnification lens, a 532 nm light source double-pulsed laser, and a commercial software, Insight 4G (TSI Inc., Shoreview, MN). The system was calibrated using monodisperse PSL particles to demonstrate the sizing accuracy of the system. The validated system was applied to measure the size distribution of the widely used ISO A2 fine dusts generated from different dust dispersers, including the ISO light duty and ISO heavy duty injectors. Results showed that this system was able to measure dusts as large as 100  $\mu\text{m}$  which was unlikely obtained by the conventional optical particle counter and aerodynamic particle sizer. It was also observed that the changes in size distribution of the A2 dusts at different mass feed rates and supply pressures indicating one should consider the effect of the operation conditions on the size distribution of dusts.