Kristine M. Tracey

Thesis

Particle Size Distribution from Light Duty Motor Vehicle Exhaust: Evaluating Different Measurement Techniques and Vehicle Technologies

Abstract

The Electrical Low Pressure Impactor (ELPI), the Scanning Mobility Particle Sizer (SMPS) and the Condensation Particle Counter (CPC) were used to examine nanoparticle emission rates and particle size distribution from eight vehicles representing different engine technologies. Five drive cycles along with several steady state cycles were used with two exhaust dilution methods.

The test set-up for studies of particle size distribution should include a neutralizer, since particles exit the tailpipe with a charge. To minimize particle formation and losses, heat is needed for dilution (particularly the mini-diluter, the dilution ratio is higher in the tunnel so heat is not essential). In addition, dilution with diesel vehicles requires a second mini-diluter.

According to the particle size distributions collected for the various vehicles, the electric hybrid has the lowest emissions, followed by the multi-port fuel injected spark ignition engine, the direct injection gasoline engine and the direct injection diesel engine.

Degree

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Completion

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Supervisors

Karman, Graham