

Particle Detectors Allow In-Situ Engine Exhaust Monitoring

Competitive Advantages

- ☑ Small, vibration-resistant detectors quantify ultrafine particles.
- ☑ Modular systems can be installed in large fleets of vehicles at low cost.
- ☑ One configuration features chemical analysis of particles.
- ☑ Useful for research, government, manufacturing, and repair facilities.

Ultrafine particles in engine exhaust are known to adversely affect human health. Capable of penetrating the alveolar-capillary barrier and evading the body's natural defenses, they are deposited in lung tissues and transported through the bloodstream. This may lead to serious health conditions such as asthma and inflammatory diseases, or even premature death.

Currently available instruments were designed for use in a laboratory and are large, expensive, sensitive to vibration; thus they are not well suited to *in situ* measurement.

Low-Cost, Onboard Detectors

Now small, inexpensive detectors that require only 5 – 10 watts of power and resist the effects of vibration can be installed in cars or other vehicles.

Two Cost-Effective Designs

One configuration (389) consists of a corona ionizer that negatively charges the particles and repels them toward a flexible printed circuit board. This component can be easily removed for chemical analysis of the collected particles, a key capability for researchers and government agencies.

Post-collection, off-board signal processing mitigates on-board processing requirements, allowing the size and cost of the detector to be minimized.

A second configuration (402) couples a MEMS-device corona ionizer to an aspiration capacitor. It offers greater portability, lower power requirements, and potentially lower per-unit cost in multiple installations.

Large fleets of cars equipped with either detector would provide a large data set for research. In addition, the technology could be used for stationary or on-board vehicle diagnostics, evaluation of control-strategy programs, and manufacturer testing of forthcoming engine designs.

Commercialization

Anticipated end-users include university and government researchers, environmental compliance and industrial hygiene officers, clean lab monitoring facilities, vehicle and diesel engine manufacturers, and automotive repair facilities.

Patent/Licensing Status

Patent pending. Exclusive rights available.

Learn More

Powerpoint presentation (389)
www.uvminnovations.com/graphics/pupsres.ppt

Illustrated poster (389)
www.uvminnovations.com/graphics/pupsposter.ppt

Detailed description (402)
www.uvminnovations.com/graphics/PDF/402_details.pdf

Primary Investigator

Britt Holmen
www.cems.uvm.edu/~baholmen/BAHwork/index.htm

Contact Us:

The Office of Technology Commercialization
802/656-8780 (tel) 802/656-8782 (fax)
email: innovate@uvm.edu
Given Building E201, Burlington, VT 05405