



## Semi-Continuous Detection of Mercury in Gases

### Opportunity

Research is currently active on the patented technology “Semi-Continuous Detection of Mercury in Gases.” The technology, which is a spinoff of the National Energy Technology Laboratory’s (NETL) GP-254 Process (U.S. patent 6,576,092), is available for licensing and/or further collaborative research from the U.S. Department of Energy’s NETL.

### Overview

This invention discloses a method for the quantitative detection of heavy metals, especially mercury, in effluent gas streams. The method employs photo-deposition and an array of surface acoustic wave sensors where each sensor monitors a specific metal.

The U.S. Environmental Protection Agency issued a national regulation for mercury removal from coal-derived flue and fuel gases in December 2011, and many states are promulgating their own rules. These rules typically require at least 91 percent capture of mercury. The levels of mercury in untreated coal-derived flue gas are on the order of 1 part-per-billion (ppb) by volume; 91 percent removal requires treated flue gas with levels of 0.1 ppb. Methods for detection of mercury in coal-derived gas streams are needed to insure compliance with emission regulations. The potential market for mercury analyzers in U.S. coal-utilizing facilities is estimated to be in excess of \$100 million.

The patented GP-254 Process introduces ultraviolet light at a wavelength of 254-nm into the flue gas, resulting in the conversion of elemental mercury to a more readily captured oxidized form. Oxidized forms of mercury tend to condense or photo-deposit on fly ash and activated carbon particles, which can facilitate mercury removal upstream of a particulate collection device such as an electrostatic precipitator or baghouse, as well as capture in a wet scrubber. The GP-254 Process can be applied to the removal of elemental mercury from low-rank coal-derived flue gases, incinerator flue gases, high sulfur trioxide flue gases, coal-derived fuel gas, and as a polishing step at the back-end of many power plants.

Photo-deposition can also serve as the basis for pre-concentration and detection of small quantities of mercury within various gas streams through mass, colorimetric, conductivity, UV absorption, or UV fluorescence sensors.

### Patent Details

U.S. Patent No. 8,069,703; issued: December 2011; titled “Semi-continuous Detection of Mercury in Gases.” Related patent available for license: U.S. Patent 6,576,092 (“Method for Removal of Mercury from Various Gas Streams”).

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### Significance

- Provides detection of heavy metals, especially mercury
- Employs photo-deposition
- Offers cost-effective, reliable monitoring system
- Addresses U.S. EPA and state limits on mercury emissions

### Applications

- Any industrial use that requires effective monitoring of mercury and other metals in effluent gas streams
- Specific applications include continuous emission monitoring of metals in industrial uses such as coal-burning power plants, gasification systems, incinerators, oil-burning boilers, refuse-derived power plants, and ambient air

### Contact

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January 2012