



Thief Carbon Catalyst for Oxidation of Mercury in Effluent Stream

Opportunity

Research is currently active on the patented technology “Thief Carbon Catalyst for Oxidation of Mercury in Effluent Stream.” The technology is available for licensing and/or further collaborative research from the U.S. Department of Energy’s National Energy Technology Laboratory.

Overview

This invention discloses a catalyst for the oxidation of heavy metals, such as mercury, from high temperature gas streams generated from industrial sources. The active component of the catalyst is partially combusted coal, termed “Thief” carbon, which can be pretreated with a halogen or left untreated in the presence of an effluent gas entrained with a halogen.

Coal-fired electrical generating plants, coal gasifiers, ore smelters, oil- or petroleum residue-fired combustors, and various waste incinerators are examples of sources that produce effluent streams containing mercury and other heavy metals. Much of the mercury within the flue gas is in a difficult-to-capture elemental form, but another form of mercury, namely oxidized mercury, is more amenable to capture. Therefore, a valuable cleanup technology would be one that could oxidize elemental mercury. If a new technology facilitated the oxidation process, mercury and other metals could be captured by existing air pollution control devices now present at coal-burning power plants and other facilities. These control devices include wet and dry scrubbers, as well as electrostatic precipitators and baghouse filters.

The invention described above provides operators with a catalyst that has the dual advantage of high oxidation levels and high adsorption levels for halogens or halogen-containing compounds. The “Thief” carbon technology, which contains between 20 and 80 percent ash by weight, also yields the advantages of a longer catalyst life and concurrent lower long-term costs.

Patent Details

U.S. Patent No. 8,071,500; issued: December 2011; titled “Thief Carbon Catalyst for Oxidation of Mercury in Effluent Stream.” Related patents available for license include: U.S. Patents 6,521,021 (“Thief Process for the Removal of Mercury from Flue Gas”) and 7,776,780 (“Catalysts for Oxidation of Mercury in Flue Gas”).

Inventor(s): Evan Granite and Henry Pennline

Contact

NETL Technology Transfer Group
techtransfer@netl.doe.gov

Significance

- Oxidizes heavy metal contaminants, especially mercury, in gas streams
- Uses partially combusted coal (“Thief” carbon)
- Yields an inexpensive catalyst
- Cheap enough to be a disposable catalyst
- Cuts long-term costs
- Simultaneously addresses oxidation and adsorption issues

Applications

- Any process requiring removal of heavy metals from effluent gas streams
- Specific for coal-fired electrical generating plants, coal gasifiers, ore smelters, oil- or petroleum residue-fired combustors, and various waste incinerators

January 2012