Heavy Vehicle Propulsion Materials

Materials Development for an Advanced Diesel Aftertreatment System

Background

With the support of the U.S Department of Energy FreedomCAR and Vehicle Technologies Program, Caterpillar has established strong in-house expertise to conduct research and development of advanced materials to be applied in diesel engine aftertreatment systems. In addition, close research and development relationships have been established with national laboratories, universities and industrial collaborators.

The Technology

Research has focused on materials development for critical technologies to reduce emissions from diesel engines, which includes lean nitrogen oxides (NO_x) catalysis (reducing NO_x with hydrocarbon reductants), particulate matter (PM) traps (sintered metal trap media), and NO_x sensing (sensing NO_x level for feedback control).

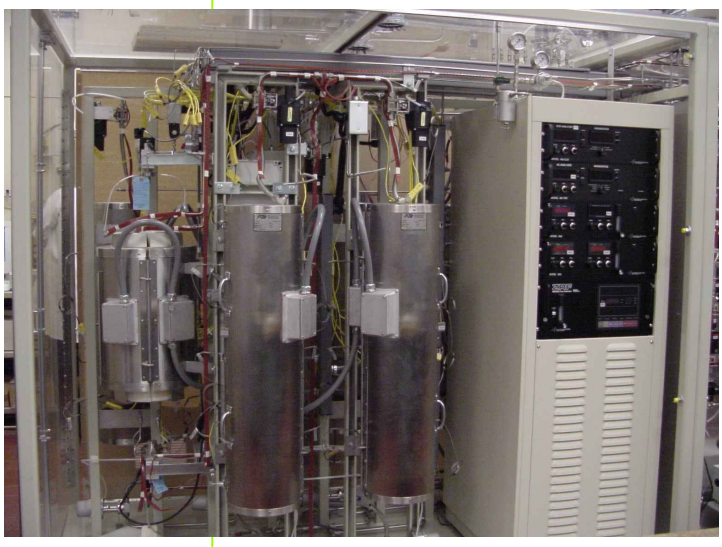
Catalyst research has focused on the combinations of catalyst materials and specific reductants that will demonstrate high NO_x reduction. Catalytic active sites and key reaction mechanisms were identified.

The PM trap project has focused on understanding the effects of filtration media properties and catalyst coatings on PM trap efficiency and regeneration. The project identified preparation procedures and the properties of high-efficiency sintered metal deep-bed filtration media.

NO_x sensor research has focused on building relationships with sensor developers to evaluate their technologies in order to locate the best available technology upon which to build.

Several bench test systems (catalyst, PM trap, and NO_x sensor benches) were built by Caterpillar to support the program.

Less dependence on foreign oil, and eventual transition to an emissions-free, petroleum-free vehicle



Caterpillar's multi-reactor catalyst bench test systems were built with a corporate capital fund to support various collaborative projects related to diesel engine aftertreatment technologies.

Commercialization

Caterpillar is seeking opportunities to establish joint development programs with vendors to apply the developed intellectual properties to aftertreatment products.

Benefits

- Improved understanding of lean-NO_x catalyst chemistry, deficiencies of current NO_x sensors, material properties of efficient filtration media, and development of improved technologies

- Accelerated commercialization of low-cost aftertreatment technologies

Where Can I Find More Information?

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A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

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