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PNNL-35683

Innovative SCR Materials and System for Low Temperature (Abstract)

CRADA #350 (PNNL #66333)

April 2024

Charles H. Peden

FCA US LLC

U.S. DEPARTMENT OF ENERGY

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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Abstract

The aim of this CRADA is focused on providing a new enabling SCR catalyst system that will function at very high efficiency to attain the most demanding emissions regulations and thereby facilitate the market introduction of advanced powertrains that will support domestic energy independence and security. Future powertrains, that will be significantly more efficient than currently available technologies, will be needed by automotive manufacturers to meet rapidly increasing CAFE and GHG standards. However, these powertrains cannot enter into the US light duty vehicle market unless they are coupled with an aftertreatment system that will sufficiently remediate tailpipe emissions to meet EPA Tier III and California SULEV emissions standards. The low temperature exhaust associated with these powertrains is especially challenging for any current aftertreatment technology to meet these standards.

The key focus of this CRADA is to further develop newly invented materials for the selective catalytic reduction (SCR) of NOx by ammonia (NH3) that show promise for significantly reducing 'light-off' temperatures compared to current commercial catalysts. Specifically, the goal of the proposed work is to achieve 'light-off' of NH3 SCR at 150 ºC in order to realize conversion efficiencies of 90% at these low temperatures. This will enable deployment of lean combustion powertrains with significantly increased fuel efficiencies but lower exhaust temperatures. To accomplish this overall goal, it will be essential to also identify an appropriate NH3 supply strategy for the SCR aftertreatment device that can controllably deliver NH3 at these low temperatures.

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