Automotive Catalysts for Clean and Fuel-Efficient Transportation: From Laboratory Studies to Field Applications

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With increasing concerns about the shortage of fossil fuel throughout the world, many countries are making considerable efforts to find the alternative energy sources. Especially, energy used in the transportation sector consists represents about 27 % of the total consumption in the US. Despite extensive research in the area of alternative propulsion sources for ground transportation, such as fuel cells and hybrid electric systems, diesel engines remain perhaps the most promising near-term solution for improving energy efficiency in the transportation sector. However, in diesel engine exhaust, it is necessary to selectively reduce nitrogen oxides (NOx) in the net oxidizing conditions.

The NOx storage-reduction (NSR) catalyst system is generally considered as one of the leading options for effectively removing NOx from the exhaust of diesel engine powered vehicles. This presentation aims to introduce the NSR catalyst and demonstrate the importance of fundamental research by showing how an understanding of the NOx chemistry and catalyst structure can be applied to solve many practical issues with this catalyst system, including sulfur poisoning.