



Special Feature: Automotive Exhaust Catalyst

Overview

Hirofumi Shinjoh

Division Manager
Inorganic Materials Division

Automotive exhaust catalysts have become indispensable in internal combustion engine vehicles for achieving almost complete removal of exhaust pollutants. Many types of catalysts have been developed to meet the severe exhaust regulations for various vehicles in different regions. However, from the point of view of global environmental protection, further efforts to improve catalytic performance are still necessary.

We have been taking a multifaceted approach to catalyst development involving material synthesis and characterization, in addition to studies on catalytic reactions, in order to gain a fundamental understanding of the mechanisms involved in catalysis.

Here, six papers are introduced that cover recent topics related to automotive catalysts: (1) a gasoline engine 3-way catalyst with noble metal sintering suppression using the support anchoring effect, (2) progress in NO_x storage-reduction catalysts for lean-burn engines, (3) performance and characterization of Fe-loaded zeolite for use as a lean-burn NO_x catalyst for NH₃ selective reduction, (4) Optimization of catalyst composition and structure by numerical simulations, (5) observations of Pt re-dispersion on a catalyst by in-situ time-resolved X-ray absorption spectroscopy, and (6) basic research on active site in exhaust catalysis using atomic size-controlled Pt clusters.