Special Feature: Novel Catalytic Approach

Overview

Toshiyuki Tanaka
Research Manager
Catalysis Lab. II

To tackle global air pollution issues, there is a strong need to realize zero-emission vehicles that are capable of almost complete removal of exhaust pollution, in addition to atmospheric purification technology that will lead to negative emissions. Achieving these goals relies heavily on developments in the field of catalysis. There has already been a considerable amount of research on the creation of novel active species and original reaction methods. This has been partially based on the application of advanced characterization techniques to catalyst surfaces with the aim of discovering innovative materials with high catalytic efficiency.(1) In addition to them, there has also been a focus on the development of methods for significantly accelerating catalytic reactions for the above purpose. This issue includes four papers introducing innovations in catalyst materials, analysis techniques, and reaction promotion methods.

Two of the papers in this issue are concerned with improvements in the gas diffusion performance of catalytic materials. The first describes the use of mesoporous Fe oxide as an environmentally friendly material for air purification, and the second introduces a new method for evaluating the gas diffusion rate in catalyst coatings. The third and fourth papers are concerned with improving catalytic reaction efficiency by using an external source of energy such as electrochemical energy or nonthermal plasma. It is hoped that the results reported here will contribute towards improving catalytic performance, and lead the way to the final goal of zero or negative emissions.

(1) R&D Review of Toyota CRDL, Vol. 42, No. 1 (2011), pp. 1-62.