第422回触媒科学研究所コロキウム

Improved NOx reduction by Using Novel Catalysts

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NOx, which comes from the combustion of fossil fuels and mobile sources, remains to be one of the most dangerous environmental pollutants. So far, great efforts have been done on the development of cost-effective and efficient DeNOx technologies. Among these technologies, the selective catalytic reduction of NO with NH3 (NH3-SCR) have been considered as one of the most promising technologies with the products mainly contain N2 and H2O. However, there remains some inevitable problems unsolved for commercial NH3-SCR catalysts, such as the volatility and toxicity of active species, the narrow operation temperature window, and especially the poor low-temperature operating activity. Herein, we provides a comprehensive review of our current research activities that focus on the rational design, shape control and morphology-dependent properties of catalysts for NOx reduction.We elaborate on the synthesis strategies of catalysts and mainly discuss their morphology-dependent properties in the catalytic applications. The compositions, morphology and surface physicochemical properties of catalysts are evaluated by traditional characterization methods, in-situ analysis as well as surface reaction techniques, and also investigated by catalytic simulations and calculations. The relationship of active components, morphologies, surface physicochemical properties and catalytic performance are established. The nature of the active centers as well as geometric and electronic effects are elucidated. The synergistic effects of various components as well as the interactions of various nanostructures have been clarified. We believe that our investigation presented here is important to researchers working in environmental catalysis.

Prof. Dengsong Zhang received his B.E. and Ph.D. degree from Shanghai University in 2002 and 2007, respectively. He then joined Shanghai University as a Lecturer. He also worked as a Research Fellow at the SHU-ESSILOR (France) Joint R&D Center. He was elected as Shanghai Education Commission's Dawn Scholars in 2008 and Shanghai Science and Technology Commission's Youth Venus in 2010. He was appointed as a Professor of Chemistry at Shanghai University in 2013. He was elected as a member of the 30th Council of the Chinese Chemical Society, a member of the New Chemical Materials Committee of the Chemical Industry and Engineering Society of China, a member of the Energy and Environment Committee of China Energy Society, and a member of the Catalysis Committee of the Chinese Society of Rare Earths. He obtained a National Natural Science Foundation for Outstanding Youth Scholars of China in 2017. His scientific interest is focused on energy and environmental catalysis. He has published more than 130 publications. His Google citations are over 8,000 with h-index of 54.

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