

Characterization of In-based/ZSM-5 catalyst for CH<sub>4</sub>-SCR

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The selective catalytic reduction (SCR) of NO by methane (CH<sub>4</sub>-SCR : CH<sub>4</sub> + O<sub>2</sub> + 2NO → CO<sub>2</sub> + 2H<sub>2</sub>O + N<sub>2</sub>) is one of the aftertreatment technologies for the control of slipped methane and thermal NO<sub>x</sub> emitted from vehicles or stationary sources by natural gas combustion. Indium containing zeolites has been reported as promising catalyst formulation for the CH<sub>4</sub>-SCR reaction due to the intrinsic activity of In cations as an active sites. The reaction intermediate such as nitrate and nitrite formed by NO oxidation possibly play a role in the activation of methane on the active sites. In this study, we prepared the In-Pt/ZSM-5 catalysts for simultaneous CH<sub>4</sub>-NO reduction. The catalysts revealed further improvement of catalytic activity by the treatment with 10% H<sub>2</sub> flow at 500 °C. The enhanced CH<sub>4</sub>-SCR performance by the reduction treatment may be attributed to the increased amount of In cations and redispersion of Pt crystallites on the external surface into the ZSM-5 channels. In addition, a series of In-based ZSM-5 catalysts has been prepared by adding Ir or Co to compare the CH<sub>4</sub>-SCR activity.