

Indium/ZSM-5 catalyst for CH₄-selective catalytic reduction (CH₄-SCR)

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The selective catalytic reduction (SCR) of NO_x by methane (CH₄-SCR : CH₄ + O₂ + 2NO → CO₂ + 2H₂O + N₂) has been studied as an alternative after treatment technology of thermal NO_x with slipped methane from natural gas combustion sources. We report the indium containing ZSM-5 catalysts for the CH₄-SCR in the presence of methane and excess of oxygen condition. The In cations in frameworks of ZSM-5 play a role in active sites of the CH₄-SCR reaction. The addition of Pt in the In/ZSM-5 promoted the NO oxidation to NO₂, resulting in formations of strong oxidant such as InNO₃ and mono-nitrosyl complex for activating methane. The reduction treatment with the H₂ flow further improved the CH₄-SCR activity over both the In,Pt/ZSM-5 and In/ZSM-5 catalysts due to the increased sites of In cations in the frameworks.