Fabrication of metal oxide loaded CHA catalyst for NH_3-SCR with LNT function and high thermal stability

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Selective catalytic reduction (SCR) with ammonia to remove NOx using Cu-exchanged CHA catalyst has been mainly used for diesel vehicles. However, the Cu/CHA catalyst has very poor activity at low temperature, making it more difficult to remove NOx by introducing exhaust gas recirculation (EGR) technology, which results in lower exhaust gas temperatures. In addition, since NH_3-SCR system using liquid urea works well above 200 °C, it is urgent to develop a technology to remove NOx at low temperature. Therefore, we fabricated SCR catalysts with LNT function to adsorb and store NOx below 200 °C and desorb above 300 °C by loading various metal oxides on CHA. In this study, NO and NH3 adsorption-desorption behavior of various metal oxides loaded CHA catalyst such as CeO_2, CaO, MgO, La_2O_3, and BaO was investigated by temperature programmed desorption method. In particular, CeO_2 or La_2O_3 loaded CHA catalysts adsorbed a considerable amount of NO and NH_3 and were very stable enough to maintain the adsorbed amount even after the hydrothermal aging at 750 °C. We also investigated the NH_3-SCR activity and thermal stability of the catalyst on which copper was additionally loaded.