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Effect of metal ions doping (M = Ti4+, Sn4+) on the catalytic performance of $MnOx/CeO_2$ catalyst for low temperature selective catalytic reduction of NO with NH3

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The abatement of nitrogen oxides (NO_x) emission from exhaust gases of diesel and stationary sources is a significant challenge for economic and social development. Ceria-based solid solutions were synthesized and used as supports to prepare $MnOx/Ce0.8Ti0.2O_2$ and $MnOx/Ce0.8Sn0.2O_2$ catalysts (Mn/CeTi and Mn/CeSn) for low temperature selective catalytic reduction of NO by NH3 (NH3-SCR). The effects of Ti or Sn doping on the catalytic performance of $MnOx/CeO_2$ catalyst were investigated. Experimental results show that doping of Ti or Sn increases the NO removal efficiency of $MnOx/CeO_2$. The NO conversion of Mn/CeTi catalyst is more than 90 % at temperature window of 175 $\sim$ 300 °C under a gas hour space velocity of 60,000 mL.g–1.h–1. Modified catalysts are also found to exhibit greatly improved resistance to sulfur-poisoning. NH3-TPD results suggest that NH3 desorption on the catalysts is observed over a wide temperature range, due to the variability of adsorbed NH3 species with different thermal stabilities. Doping of Ti and Sn into Mn/CeO_2 greatly increased the NH3 adsorption ability of the composites which could promote the SCR reaction. Characterization results also indicate that doping of Ti or Sn brings about catalysts with higher BET surface area, enhanced oxygen storage capacity and increased surface acidity.