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Ho_2O_3-modified MnO_x-TiO_2 catalyst for SCR De-NO_x with NH_3

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Nitrogen oxides (NOx) emission from the combustion of fossil fuels and biomasses is a major global environmental issue. It contributes to acid rain, formation of ground level ozone and yellow smog, which could lead to serious damages to human health and our ecosystem. The selective catalytic reduction (SCR) has been proved to be one of the most effective methods for post combustion denitration (de-NO_x). It converts NOx in flue gases to harmless N_2 and H_2O. Among many low-temperature catalysts reported in the literature, manganese oxide (MnOx) has been proved highly active at low temperature between 75°C and 225°C. However, single MnO_x catalysts are unstable, easy to be poisoned and deactivated by SO_2 and their operation temperature window is narrow. To overcome the drawbacks of pure MnO_x, we modified the TiO_2 supported MnO_x (MnO_x-TiO_2) by using small amount of holmium oxide (Ho_2O_3). The obtained catalyst exhibited a wide operating temperature window with a 100% NOx conversion activity from 150 to 390°C and a 100% N_2 selectivity from 150 to 360°C under a high space velocity of 36,000 h^{-1}. The high efficiency is attributed to structural and electronic changes induced by Ho_2O_3 modification. Additionally, Ho_2O_3 modification promotes the stability of MnO_x-TiO_2 catalyst against SO_2 poison, especially SO_2 poison under concurrent H_2O vapor influence.

Biography

Chen Gao received his Bachelor's degree of Electrical Engineering and he is pursuing his PhD degree at Xi'an Jiaotong University under the guidance of Prof. Chunming Niu and Associate Prof. Jian-Wen Shi. His research interests are in air pollution control techniques and environmental catalysis for removing NO_x at low temperature.

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