Supplementary Material (ESI) for Catalysis Science & Technology
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Novel $MnWO_x$ catalyst with remarkable performance for low temperature NH_3-SCR of NO_x

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Electronic Supplementary Information

The stability test of $MnWO_x$ catalyst in NH_3-SCR reaction

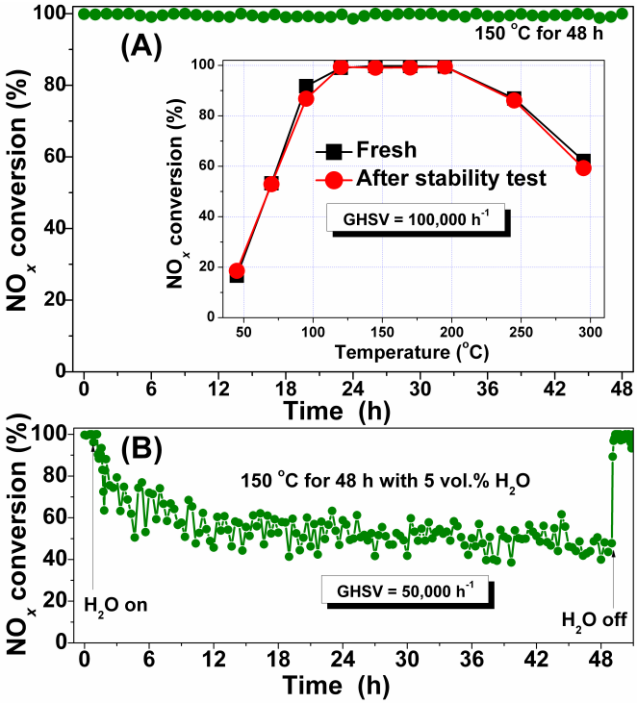

Fig. S1. (A) The NO_x conversion over $MnWO_x$ catalyst in NH_3-SCR reaction at 150 ^oC for 48 h under GHSV of 100,000 h^{-1} (inserted: the SCR activity of $MnWO_x$ catalysts before and after stability test as a function of temperature); (B) The NO_x conversion over $MnWO_x$ catalyst in NH_3-SCR reaction in the presence of 5 vol.% H_2O at 150 ^oC for 48 h under GHSV of 50,000 h^{-1}.

To better test the stability of $MnWO_x$ catalyst in the deNO_x process, we also carried out the NH_3-SCR reaction at 150 ^oC for 48 h under the GHSV of 100,000 h^{-1}, and during the reaction period that we investigated the NO_x conversion was always maintaining at 100% as shown in Fig. S1(A). After the stability test, we again tested the SCR performance of the used $MnWO_x$ catalyst in the whole temperature range, and no decline of SCR activity was observed at all comparing with the fresh catalyst. These results clearly indicate that the $MnWO_x$ catalyst is highly stable in the NH_3-SCR reaction at low temperatures, which is advantageous to the practical use. We also carried out the stability test of $MnWO_x$ catalyst in the presence of 5 vol.% H_2O at 150 ^oC for 48 h under the GHSV of 50,000 h^{-1}. As we can clearly see, after the addition of H_2O, the NO_x conversion over $MnWO_x$ catalyst decreased from 100% to *ca.* 60% in nearly 12 h (possibly due the competitive adsorption of H_2O and the slow deposition of ammonium nitrate onto catalyst surface) and then maintained at *ca.* 60% for the next 36 h. After the shutting off of H_2O, the NO_x conversion returned to 100% rapidly, indicating that the deactivation effect of H_2O on the NH_3-SCR activity of $MnWO_x$ catalyst at this temperature point is reversible. If operating at temperatures above 150 ^oC, this $MnWO_x$ catalyst can have long term stability even in the presence of water vapour.

In situ DRIFTS results about the influence of H_2O on the NH_3/NO_x adsorption and NH_3-SCR reaction over $MnWO_x$ catalyst

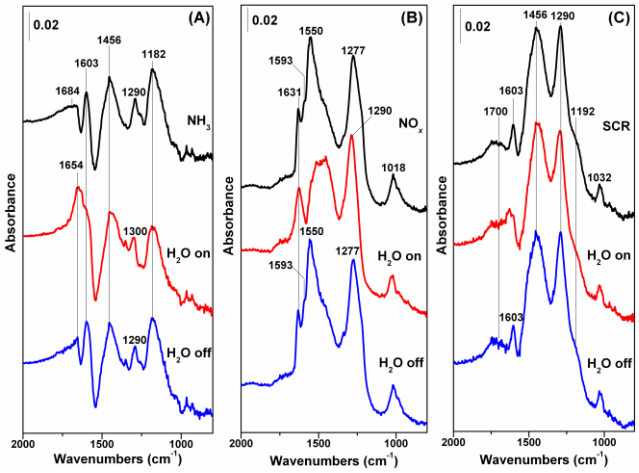

Fig. S2. *In situ* DRIFTS results about the influence of H_2O on (A) NH_3 adsorption, (B) NO_x adsorption and (C) NH_3-SCR reaction over $MnWO_x$ catalyst at 100 ^oC.

Peak assignments:

(A) 1684/1654 and 1456 cm^{-1} (NH_4^+); 1603 and 1182 cm^{-1} (coordinated NH_3); 1290 cm^{-1} (unknown assignment).

(B) 1631 cm^{-1} (bridging nitrate); 1593 and 1018 cm^{-1} (bidentate nitrate); 1550 and 1277 cm^{-1} (monodentate nitrate).

(C) 1700 cm^{-1} (NH_4^+);1603 and 1192 cm^{-1} (coordinated NH_3); 1456 and 1290 cm^{-1} (surface ammonium nitrate species); 1032 cm^{-1} (bidentate nitrate).