Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Insight into the synergism between MnO_2 and Acid Sites over Mn-SiO_2@TiO_2 Nano-cups for Low-Temperature Selective Catalytic Reduction of NO with NH_3

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Experimental section

Characterization methods

The NO adsoprtion of the catalysts was detected using the temperature-programmed desorption of nitric oxide (NO-TPD) on a Quantachrome Autosorb-IQ-C chemisorption analyser. The sample powders were firstly pre-treated in pure He at 300 ºC for 1h and then cooled down to 50 ºC. The catalysts were constantly saturated in anhydrous NO (10% in He) at a flow rate of 30ml/min for 30min and the physical adsorption of NO was removed by He for 30min. Finally, the desorption was carried out by heating the samples from 50 to 400 ^{o}C at a heat rate of 10 ^{o}C/min.

Catalyst test

The oxidation of NO to NO_2 was measured in the same fixed-bed reactor as mentioned in the manuscript. The composition of reactants were as follows: 1000ppm NO, 5% O_2 and balance N_2, with the total flow rate of 200 ml min^{-1}. And the GHSV was also kept at 30000h^{-1}.

Table S1. The physical properties of the 120h-stability-tested Mn-SiO_2@TiO_2-2.5 sample

Catalysts	SSA [a] (m^2g^{-1})	Pore volume[a] (cm^3g^{-1})	Pore Diameter[a] (nm)
Used Mn-SiO_2@TiO_2-2.5 sample	64.49	0.136	11.98

[a] Specific surface area (SSA) and pore volume by N_2-adsorption method.

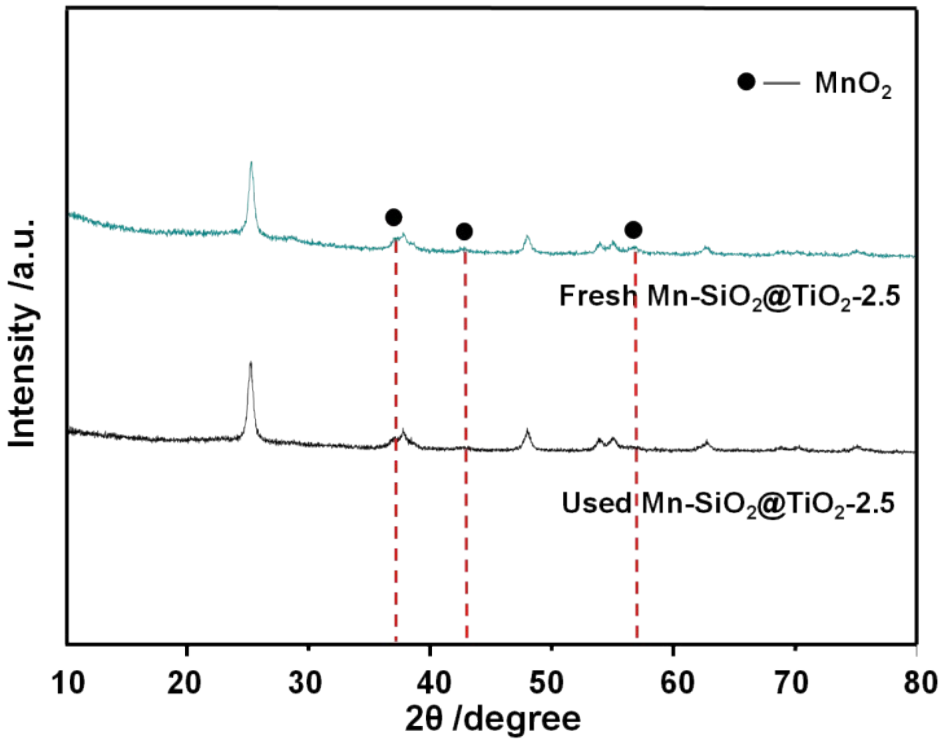

Figure S1 XRD patterns of the fresh and stability-tested Mn-SiO_2@TiO_2-2.5 catalysts

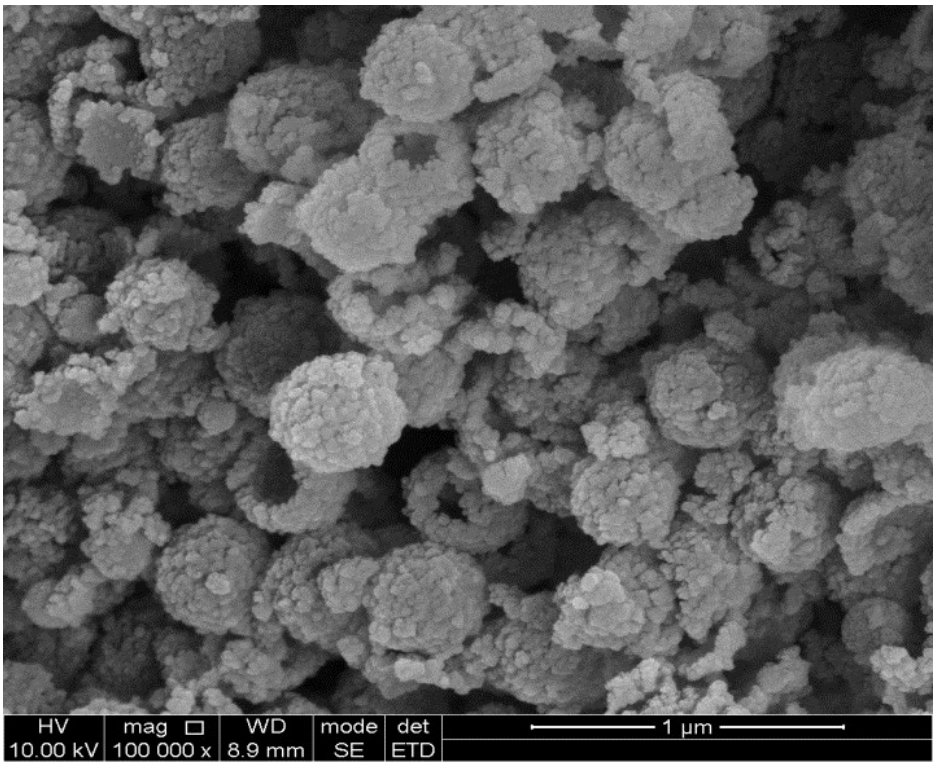

Figure S2 SEM image of Mn-SiO_2@TiO_2-2.5 catalyst after 120h-stability test

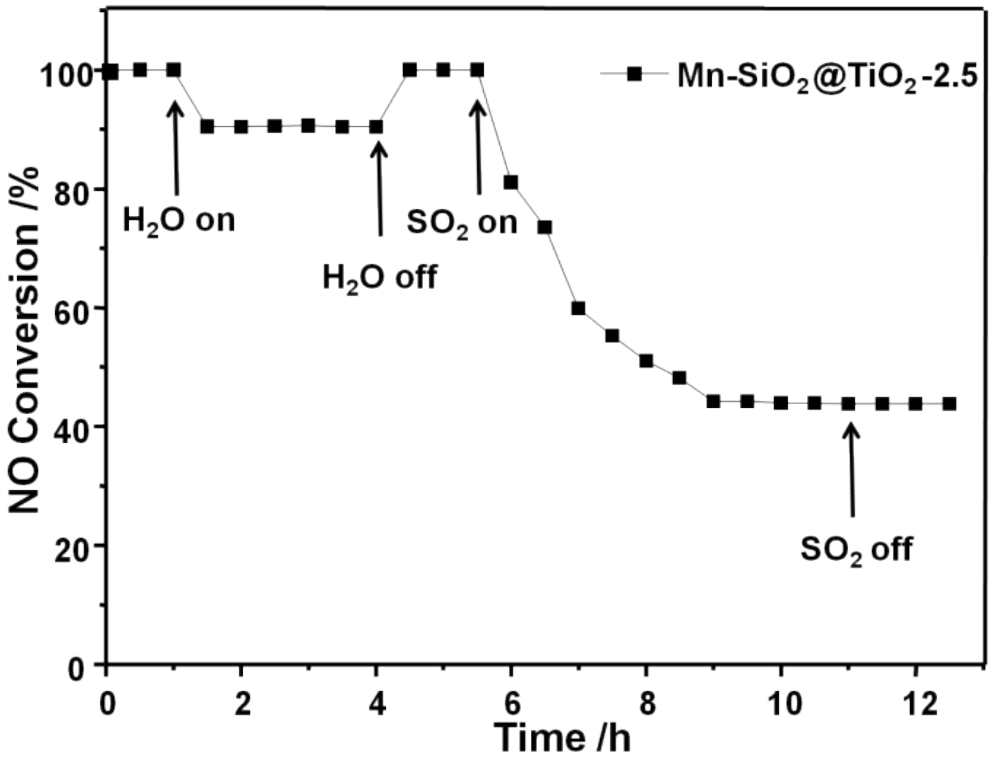

Fig. S3 SO_2 and H_20 poisoning effect on the NO conversion of Mn-SiO_2@TiO_2-2.5 catalyst. Reaction conditions: [NO]= [NH_3] =1000ppm, [O_2]=5%, [H_2O]=5 vol% (when used), [SO_2]=200ppm (when used), balance N_2, GHSV=30000h^{-1}

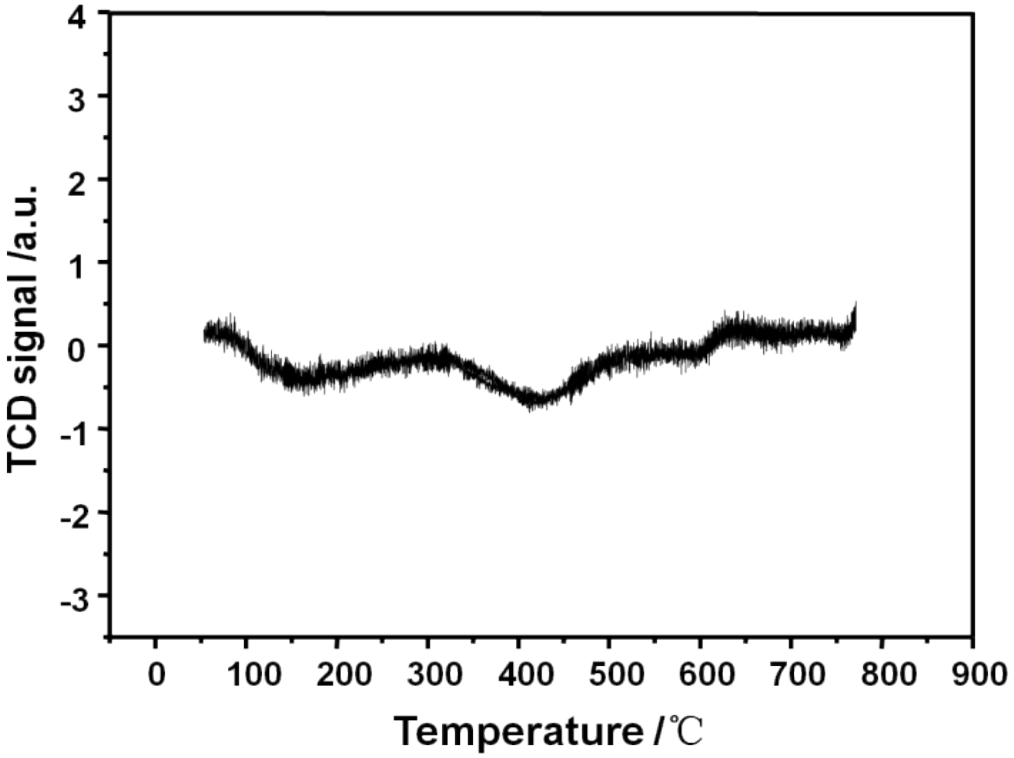

Fig. S4 TCD signal of Mn-SiO_2@TiO_2-2.5 catalyst saturated in He from 50-800 ºC

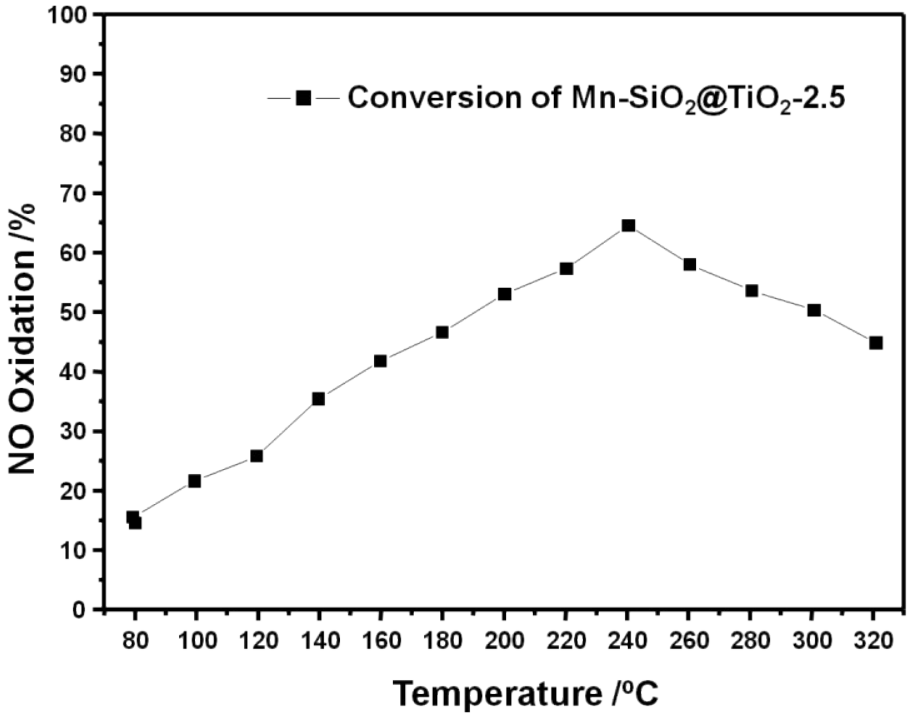

Fig. S5 The NO conversion to NO_2 of the Mn-SiO_2@TiO_2-2.5 catalyst. Reaction conditions: [NO]=1000ppm, [O_2]=5%, balance N_2, GHSV=30000h^{-1}

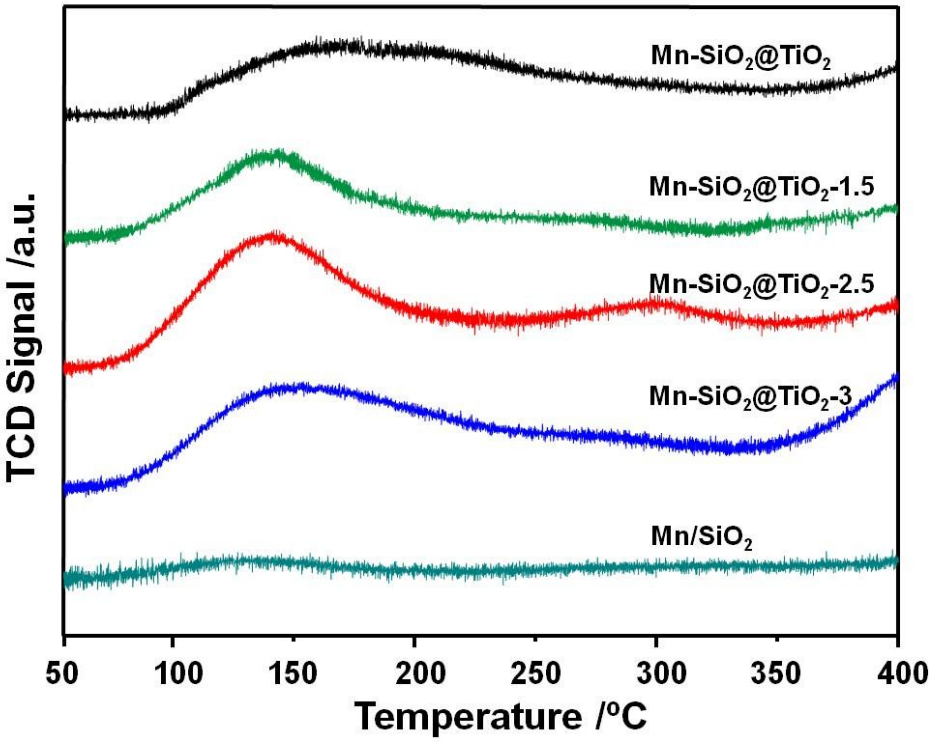

Fig. S6 NO-TPD profiles of the Mn-based nano-cup catalysts