NO Catalytic Oxidation over Ultra-large Surface Area LaMnO$_{3+\delta}$

Perovskite Synthesized by Acid-etching Method

Baohuai Zhao, a Rui Ran, a,R Li Sun, a Xingguo Guo, a Xiaodong Wu b and Duan Weng a,b,*

a State Key Laboratory of New Ceramic and Fine Processing, School of Materials Science and Engineering, Tsinghua University, Beijing 100084, China

b Key Laboratory of Advanced Materials (MOE), School of Materials Science and Engineering, Tsinghua University, Beijing 100084, China

In-situ diffuse reflectance infrared Fourier-transform spectroscopy (DRIFTS) was performed at a resolution of 4 cm$^{-1}$ in the range of 400 - 4000 cm$^{-1}$, using a Nicolet iS50 spectrometer equipped with a mercury cadmium telluride detector. The catalysts were pretreated in the DRIFTS cell at 300 °C in 10% O$_2$/N$_2$ for 30 min to clean the surface of the catalyst and then cooled down to 30 °C. Then the background spectrum was recorded in N$_2$ at each selected temperature. After background spectrum subtraction, the catalysts were exposed to reactant gas mixture containing 500 ppm NO, 10% O$_2$, balanced with N$_2$ for 30 min to reach a steady state. The spectra were recorded with time. Then the temperature was ramped up to 300 °C and the spectra were recorded at intervals of 50 °C. The total flow rate was maintained at 100 mL min$^{-1}$.

Fig. S1 shows the adsorption spectra as functions of time at 30 °C and along with temperature ramping in the range 800 - 2000 cm$^{-1}$. The spectrum contains bands at 1625, 1590, 1547, 1496, 1283, 1226, and 1028 cm$^{-1}$. The bands at 1625, 1590, 1547, 1496 and 1283 cm$^{-1}$ are assigned to nitrate species $^{1-14}$, those at 1028 and 1226 cm$^{-1}$
are attributed to nitrite species.\textsuperscript{3, 5, 6, 9, 14}

Fig. S1 Evolution of \textit{in-situ} DRIFTS of LMO-12. Reaction conditions: 500 ppm NO, 10\% \textit{O}_2, and \textit{N}_2 balance; total flow rate 100 mL min\textsuperscript{-1}; temperature rate 10 \textdegree C min\textsuperscript{-1}.

\textbf{Notes and references}