Supplementary Information

Promotional Effect of Lanthana on High Temperature Thermal Stability of Pt/TiO$_2$ Sulfur Resistance Diesel Oxidation Catalyst

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Fig. 1 The CO (a) and C$_3$H$_6$ (b) oxidation conversion over as-prepared Pt/TiO$_2$, Pt/TiO$_2$-La$_2$O$_3$ and commercial Pt/Al$_2$O$_3$, Pt-Pd/CeO$_2$-ZrO$_2$-Al$_2$O$_3$ catalysts

Reaction conditions: C$_3$H$_6$: 330 ppm, CO: 1000 ppm, NO: 200 ppm, O$_2$: 10%, CO$_2$: 8%, vapor: 7%, SO$_2$: 50 ppm, N$_2$: balance, GHSV = 60,000 h$^{-1}$. Commercial Pt/Al$_2$O$_3$, Pt-Pd/CeO$_2$-ZrO$_2$-Al$_2$O$_3$ DOC catalysts were supplied by Sichuan provincial vehicular exhaust gases abatement engineering technology center. All catalysts were pre-treated at 500 °C for 3h under the reaction atmosphere before running the performance test.
Fig. 2 The CO and C$_3$H$_6$ oxidation conversion over Pt/TiO$_2$(850) and Pt/TiO$_2$-La$_2$O$_3$ (850) catalysts

Reaction conditions: C$_3$H$_6$: 330 ppm, CO: 1000 ppm, NO: 200 ppm, O$_2$: 10%, CO$_2$: 8%, vapor: 7%, SO$_2$: 50 ppm, N$_2$: balance, GHSV = 60,000 h$^{-1}$. The Pt/TiO$_2$(850) and Pt/TiO$_2$-La$_2$O$_3$(850) catalysts were obtained by baking the fresh monolithic catalysts at 850 °C for 3h under the air. All catalysts were pre-treated at 500 °C for 3h under the reaction atmosphere before running the performance test.

Fig. 3 The CO and C$_3$H$_6$ oxidation conversion over Pt/TiO$_2$(A) and Pt/TiO$_2$-La$_2$O$_3$ (A) catalysts

Reaction conditions: C$_3$H$_6$: 330 ppm, CO: 1000 ppm, NO: 200 ppm, O$_2$: 10%, CO$_2$: 8%, vapor: 7%, SO$_2$: 50 ppm, N$_2$: balance, GHSV = 60,000 h$^{-1}$. The simulative 160 000 km vehicle aged catalysts, Pt/TiO$_2$(A) and Pt/TiO$_2$-La$_2$O$_3$(A), obtained by following the reference [J. Andersson et. al., Appl. Catal. B: Environ., 72 (2007) 71-81]. The fresh monolithic catalysts were placed in the reactor and aged at 670 °C for 15 h and then at 250 °C for 15 h in the aging gases: 600 ppm C$_3$H$_6$, 1500 ppm CO, 200 ppm NO, 50 ppm SO$_2$, 5% O$_2$, 4% CO$_2$, 8% vapor, and N$_2$ balance at 800 mL/min flow rate. All catalysts were pre-treated at 500 °C for 3h under the reaction atmosphere before running the performance test.
The CO and C\textsubscript{3}H\textsubscript{6} oxidation conversion over fresh and high temperature treated Pt/TiO\textsubscript{2}-YO\textsubscript{x}, Pt/TiO\textsubscript{2}-La\textsubscript{2}O\textsubscript{3} catalysts

Reaction conditions: C\textsubscript{3}H\textsubscript{6}: 330 ppm, CO: 1000 ppm, NO: 200 ppm, O\textsubscript{2}: 10\%, CO\textsubscript{2}: 8\%, vapor: 7\%, SO\textsubscript{2}: 50 ppm, N\textsubscript{2}: balance, GHSV = 60,000 h\textsuperscript{-1}. The Pt/TiO\textsubscript{2}-YO\textsubscript{x}(750) and Pt/TiO\textsubscript{2}-YO\textsubscript{x}(850) catalysts were obtained by baking the fresh Pt/TiO\textsubscript{2}-YO\textsubscript{x} monolithic catalysts at 750 °C and 850 °C for 3h under the air, respectively. All catalysts were pre-treated at 500 °C for 3h under the reaction atmosphere before running the performance test.
Fig. 5 TEM micrographs of the fresh Pt/TiO$_2$ (a)(b) and Pt/TiO$_2$-La$_2$O$_3$ (c)(d) catalysts

Fig. 6 XPS (Pt 4f) spectra of the Pt/TiO$_2$, Pt/TiO$_2$-La$_2$O$_3$, Pt/TiO$_2$(A) and Pt/TiO$_2$-La$_2$O$_3$(A) catalysts