catalysts

MDPI

Supplementary

A bifunctional Pt/CeO_2-Cu_1/CeO_2 catalyst system for isooctane oxidation under fully simulated engine exhaust condition: eliminating the inhibition by CO

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S1. Comparison of isooctane oxidation activity of Pt/CeO_2 +Cu_1/CeO_2 catalyst mixture under the O_2+NO+CO and S-GDI conditions

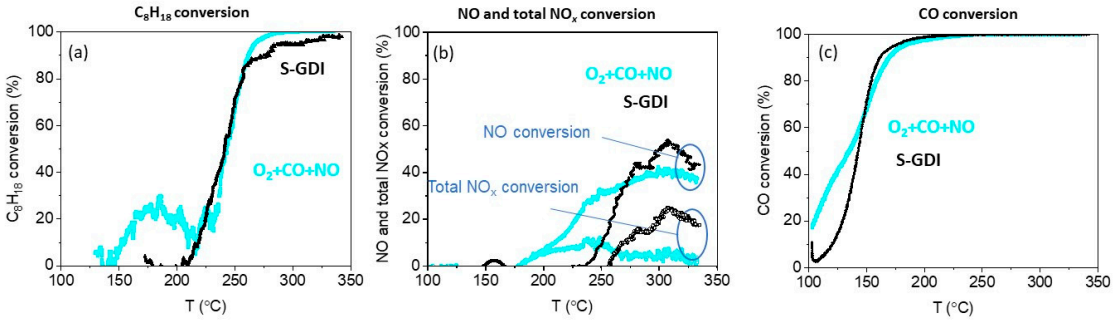

Figure S1. Light-off curves of isooctane (a), NO (b), and CO (c) on Pt/CeO_2 +Cu_1/CeO_2 catalyst mixture (1:1 weight ratio) under fully simulated stoichiometric (S-GDI) and O_2+NO+CO (0.74% O_2 +1400 ppm NO +3500ppm CO) conditions (space velocity: 200L h^{-1} $g_{Pt/CeO2}^{-1}$).

S2. Activity of a bi-metallic Pt/Cu_1/CeO_2 catalyst

A bi-metallic catalyst with Pt clusters and Cu single atom sites co-impregnated on the same CeO_2 support was synthesized by loading the $[Pt(NH_3)_4](NO_3)_2$ precursor on an as-synthesized Cu_1/CeO_2 single atom catalyst (prepared by 800 °C calcination for 10 h) followed by 500°C calcination for 4 h. Figure S1 compares the isooctane light-off curves of the Pt/CeO_2 monometallic catalyst, the Pt/CeO_2-Cu_1/CeO_2 catalyst mixture, and the Pt/Cu_1/CeO_2 bi-metallic catalyst (all with equivalent Pt amount), under fully simulated LTC-G condition (10% O_2, 6% H_2O, 6% CO_2, 2000ppm CO, 800ppm NO, 400ppm H_2, 375ppm isooctane). While the light-off curves of Pt/CeO_2 and Pt/CeO_2-Cu_1/CeO_2 overlapped with each other, the co-impregnation catalyst Pt/Cu_1/CeO_2 has higher light-off temperature. This indicates that co-impregnation of Pt clusters and Cu single atom sites somehow leads to the deactivation of Pt sites, probably due to the formation of Pt-Cu alloy.

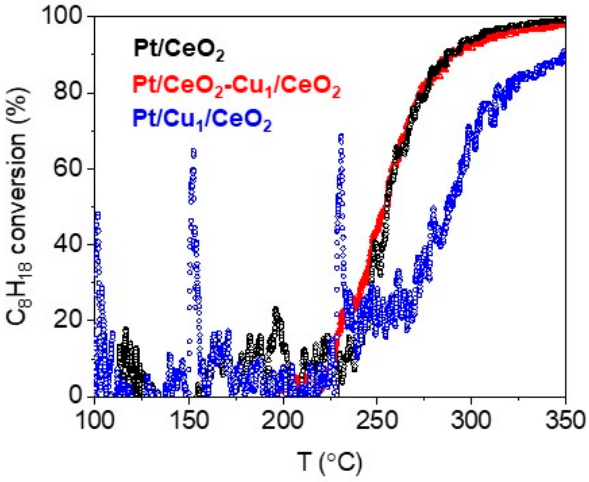

Figure S2. Light-off curves of isooctane on Pt/CeO_2, Pt/CeO_2-Cu_1/CeO_2, and $Pt/Cu_1/CeO_2$ catalysts under fully simulated LTC-G stoichiometric condition (10% O_2, 6% H_2O, 6% CO_2, 2000ppm CO, 800ppm NO, 400ppm H_2, 375ppm isooctane) (space velocity: 200L h^{-1} $g_{Pt/CeO2}^{-1}$).