

Supporting Information

Addition of Pd on $\text{La}_{0.7}\text{Sr}_{0.3}\text{CoO}_3$ Perovskite To Enhance Catalytic Removal of NO_x

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1. XANES and XPS Measurements

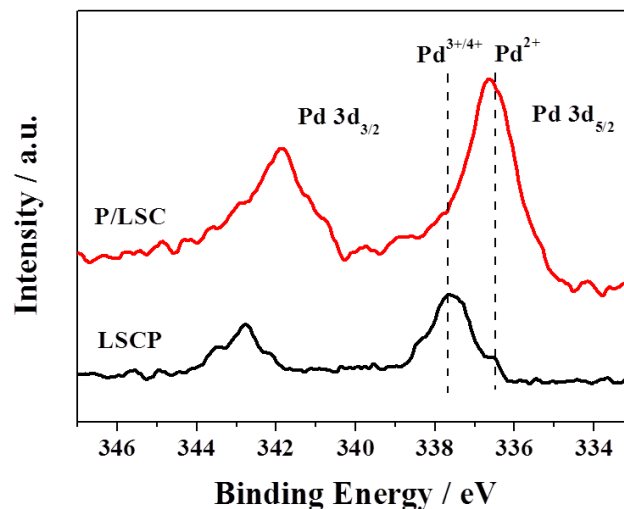


Figure S1 XPS spectra of Pd 3d of the fresh LSCP and P/LSC catalysts.

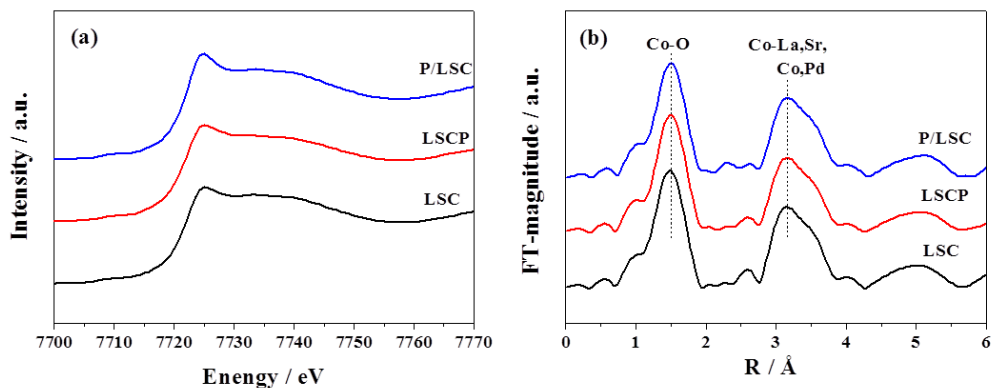


Figure S2 (a) Normalized Co K-edge XANES of the catalysts; (b) Co K-edge radial distribution functions of the catalysts.

To obtain more information about the coordination environment and the oxidation state change of Co ions after addition of Pd, the Co k-edge XANES spectra were carried out. It is observed in Figure S2a that the addition of Pd does not bring an apparent influence on valence

state of Co. This is possibly because the adding amount of Pd is too small, not enough to make an observable difference on Co valance even under the condition that the Pd was also introduced into B site. Figure S2b shows the radial distribution functions (RDFs) data of Co K-edge to further illustrating the coordination environment of Co in the solid solution. The coordination peak at 1.52 Å refers to the first Co-O coordination shell. The second coordination shell centered at 3.23 Å is attributed to the coordination of Co with Pd and other B-site cations (including itself, e.g. La, Sr, Co, Pd). Due to the relatively complex coordination conditions in dually substituted perovskite, this peak exhibits irregular shape with shoulder peaks. However, little difference is found between the profiles, confirming that the addition of Pd does not obviously affect the coordination environment of Co.

Table S1

XPS Results of the Catalysts after being reduced in the 1000 ppm of C₃H₆ flow at 300 °C for 2 min.

Catalyst	Pd 3d _{5/2} (eV)	Pd/La (atomic %)
LSCP	335.3	0.02
P/LSC	335.2	0.07

2. Activity Tests

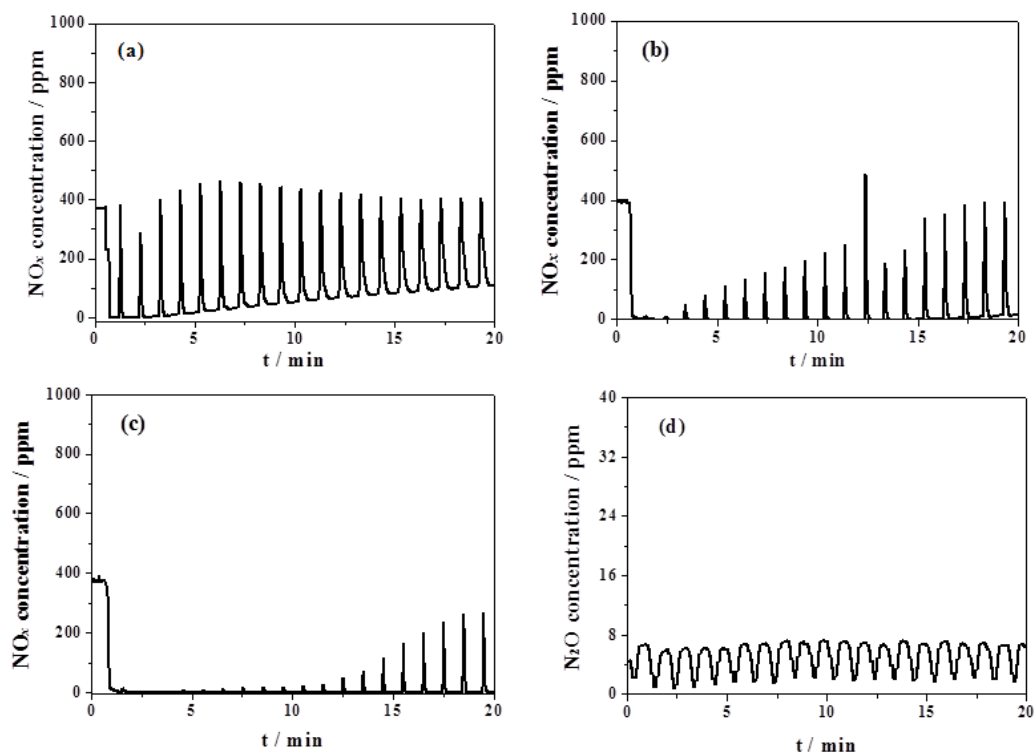


Figure S3 NO_x concentrations during the alternative NO_x storage and reduction cyclings over (a) LSC, (b) LSCP, (c) P/LSC, and (d) N₂O concentration over P/LSC. Lean-burn phase: 50 s, 400 ppm of NO / 5 vol % O₂ / N₂; fuel-rich phase: 10 s, 1000 ppm of C₃H₆ / N₂ (space velocity: 120,000 mL g⁻¹ h⁻¹).

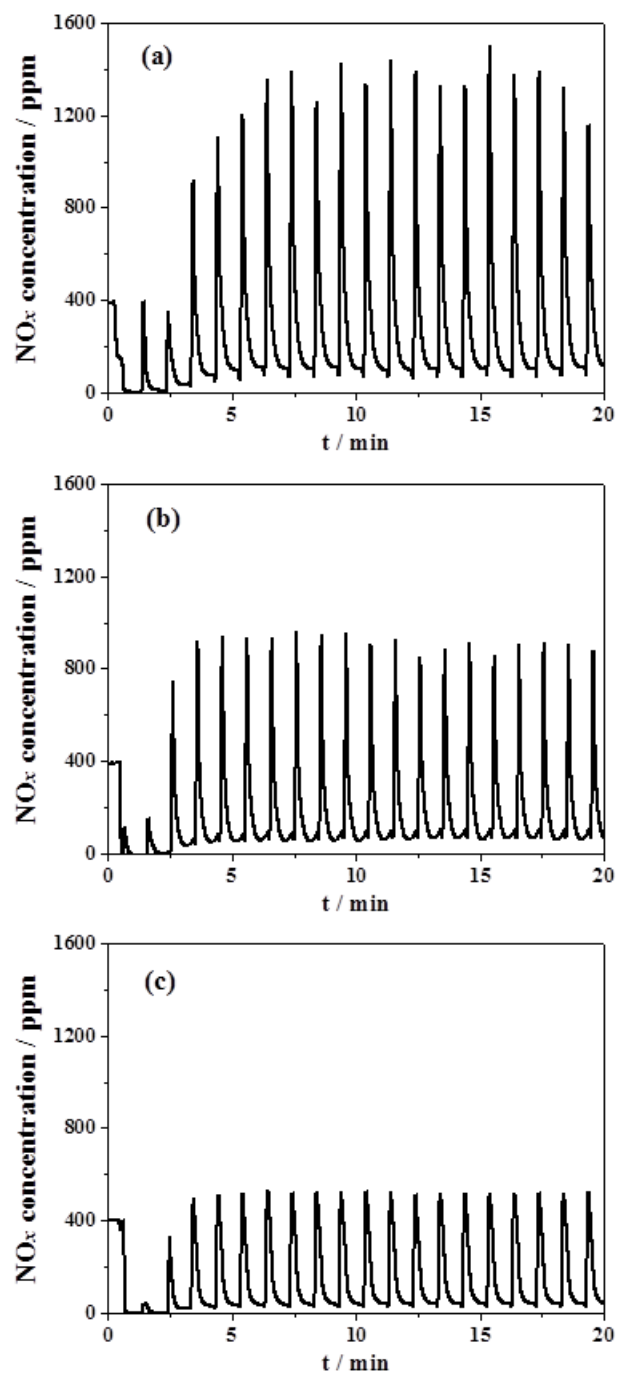


Figure S4 NO_x concentrations during the alternative NO_x storage and reduction cyclings in the presence of H₂O and CO₂ over (a) LSC, (b) LSCP, and (c) P/LSC. Lean-burn phase: 50 s, 400 ppm of NO / 5 vol % O₂ /

4 vol.% H₂O / 5 vol.% CO₂ / N₂; fuel-rich phase: 10 s, 1000 ppm of C₃H₆ / 4 vol.% H₂O / 5 vol.% CO₂ / N₂
(space velocity: 120,000 mL g⁻¹ h⁻¹).

Table S2

The Amounts of the Desorbed NO_x over the Spent Catalysts in Figure 13a.

catalyst	NO _x desorption amount (μmol g ⁻¹)
LSC	620.8
LSCP	705.4
P/LSC	193.2

Table S3

The Amounts of the Desorbed NO_x over the P/LSC Catalysts in the Lean-burn Atmosphere in Figure 13b.

Catalyst	NO _x desorption amount (μmol g ⁻¹)
NO _x storage for 3 min	125.8
NO _x storage for 5min	199.4
NO _x storage for 13 min	505.3