Supporting information

NO$_x$ reduction by CO over ASC catalysts in a simulated rotary reactor: effect of CO$_2$, H$_2$O and SO$_2$

Peiliang Sun$^{a,b}$, Xingxing Cheng$^{a,b,1}$*, Yanhua Lai$^b$*, Zhiqiang Wang$^{a,b}$, Chunyuan Ma$^{a,b}$, Jingcai Chang$^{a,b}$

$^a$ National Engineering Lab for Coal-fired Pollutant Emission Reduction, School of Energy and Power Engineering, Shandong University, Jinan, 250061, China
$^b$ School of Energy and Power Engineering, Shandong University, Jinan, 250061, China

* Corresponding Authors. Xingxing Cheng, tel: (86) 531-88399372(615), fax: (86) 531-88385877, email: xcheng@sdu.edu.cn. Yanhua Lai, tel: (86) 531-88392637, email: layh@sdu.edu.cn
Fig. S1  The schematic of the fixed bed experimental system

Fig. S2  NO\textsubscript{x} adsorption capacity of catalysts at different temperatures in 800 s
**Fig. S3** Dimensionless outlet NO\textsubscript{x} concentration in the simulated rotary reactor. ((a) T = 200 °C, (b) T = 250 °C)

![Graph showing NO\textsubscript{x} concentration in the simulated rotary reactor at 200 °C and 250 °C, with adsorption and reduction stages highlighted.]

**Fig. S4** Dimensionless outlet NO\textsubscript{x} concentration in the simulated rotary reactor. ((a) T = 200 °C, (b) T = 250 °C)

![Graph showing NO\textsubscript{x} concentration in the simulated rotary reactor at 200 °C and 250 °C, with adsorption and reduction stages highlighted, and the effect of H\textsubscript{2}O addition.]
Table S1  NO$_x$ adsorption capacity of catalysts under different conditions in 800 s

| Conditions              | Adsorption capacity (mg/g) |
|-------------------------|-----------------------------|
| Baseline group          | 0.660                       |
| 15 % CO$_2$             | 0.580                       |
| 5 % H$_2$O              | 0.516                       |
| 10 % H$_2$O             | 0.330                       |
| 10 % H$_2$O + 15 % CO$_2$ | 0.290                       |

Table S2  The influence of CO$_2$ on the NO adsorption and reduction efficiencies

| Temperature | NO adsorption efficiency | NO reduction efficiency |
|-------------|--------------------------|-------------------------|
|             | no CO$_2$ | adding CO$_2$ | no CO$_2$ | adding CO$_2$ |
| 150 °C      | 87.0%     | 59.7%         | 4.4%      | 3.4%         |
| 200 °C      | 93.4%     | 87.6%         | 19.9%     | 1.2%         |
| 250 °C      | 88.6%     | 90.8%         | 32.8%     | 4.0%         |
### Table S3  NO adsorption and reduction efficiencies of catalyst under wet condition

|          | NO adsorption efficiency |                      | NO reduction efficiency |                      |
|----------|--------------------------|-----------------------|-------------------------|-----------------------|
|          |                         | no H₂O                | adding H₂O              | no H₂O                | adding H₂O              |
| 150 °C   | 87.0%                   | 39.6%                 | 4.4%                    | 0.1%                  |
| 200 °C   | 93.4%                   | 65.9%                 | 19.9%                   | 4.8%                  |
| 250 °C   | 88.6%                   | 78.2%                 | 32.8%                   | 24.8%                 |

### Table S4  Influence of SO₂ on NO adsorption and reduction efficiencies

|          | NO adsorption efficiency |                      | NO reduction efficiency |                      |
|----------|--------------------------|-----------------------|-------------------------|-----------------------|
|          |                         | no SO₂                | adding SO₂ 45 min        | no SO₂                | adding SO₂ 45 min        |
| 150 °C   | 87.0%                   | 37.3%                 | 4.4%                    | 4.2%                  |
| 200 °C   | 93.4%                   | 34.9%                 | 19.9%                   | 10.2%                 |
| 250 °C   | 88.6%                   | 39.5%                 | 32.8%                   | 11.8%                 |