

Supporting Information

Highly performance Ce doped 3DOM Co-based catalyst on CO oxidation

Kun Zhou[‡]^a · Miaomiao Hu[‡]^{a,c} · Tingyi Zhao^a · Qingzhao Shi^b · Jiaxin Feng^a · Xue Ma^a · Mingqin Zhao^a
· Zihui Shao^a · Bing Cui^{a,*}

^a Flavors and Fragrance Engineering & Technology Research Center of Henan Province, College of Tobacco Science, Henan Agricultural University, Zhengzhou 450002, PR China

^b Key Laboratory of Tobacco Flavor Basic Research of CNTC, Zhengzhou Tobacco Research Institute of CNTC, Zhengzhou 450000, PR China.

^c School of Ecology and Environment, Zhengzhou University, Zhengzhou 450001, PR China

[‡] These authors contributed equally to this work.

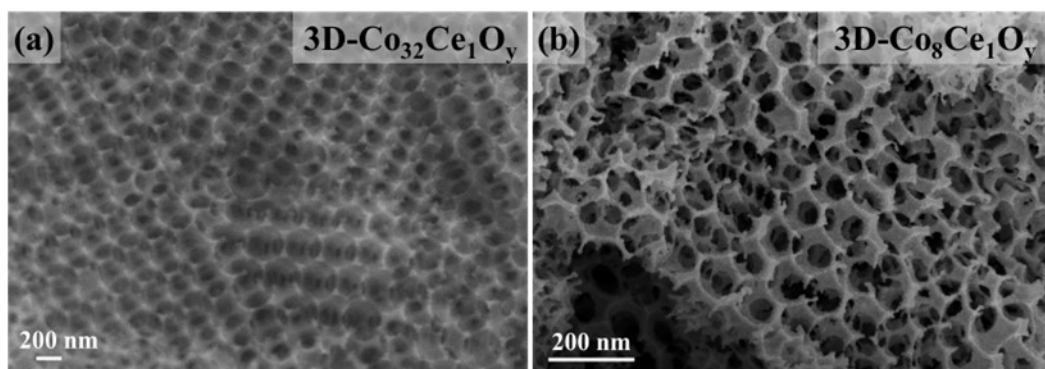


Fig. S1 SEM images of 3D-Co₃₂Ce₁O_y (a), 3D-Co₈Ce₁O_y (b).

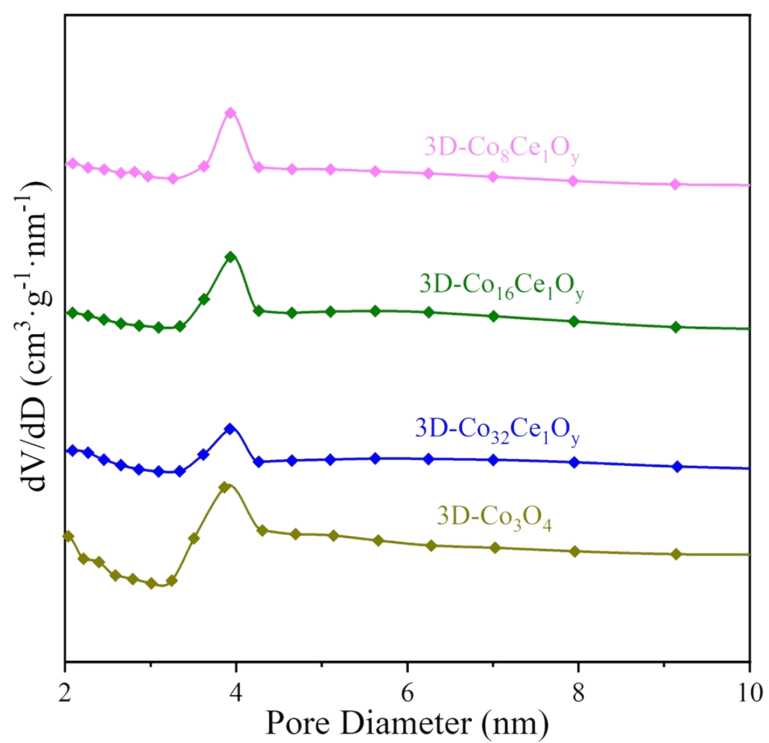


Fig. S2 The pore size distribution of the mesoporous diagram of 3D-Co₃O₄ and 3D-Co_xCe₁O_y catalysts

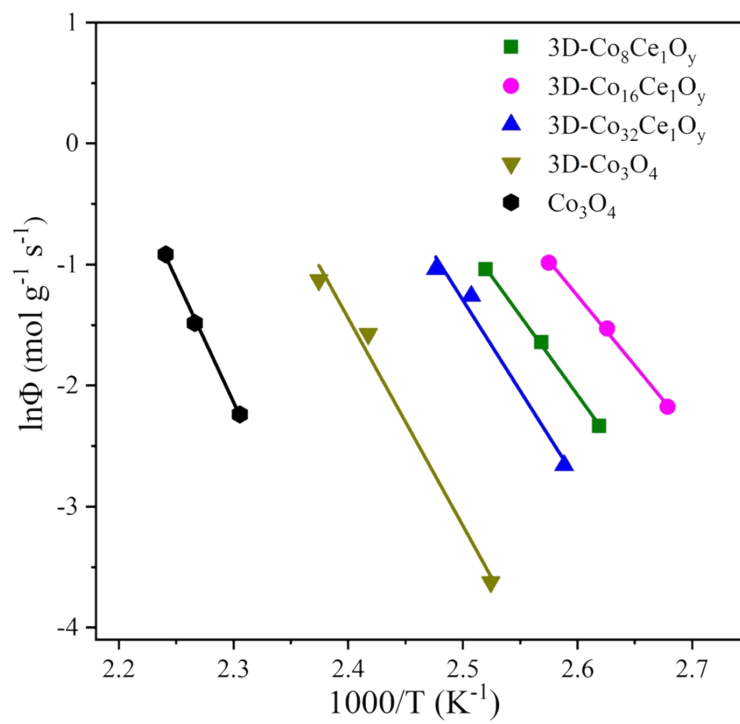


Fig. S3 Ozawa plots over the prepared catalysts.

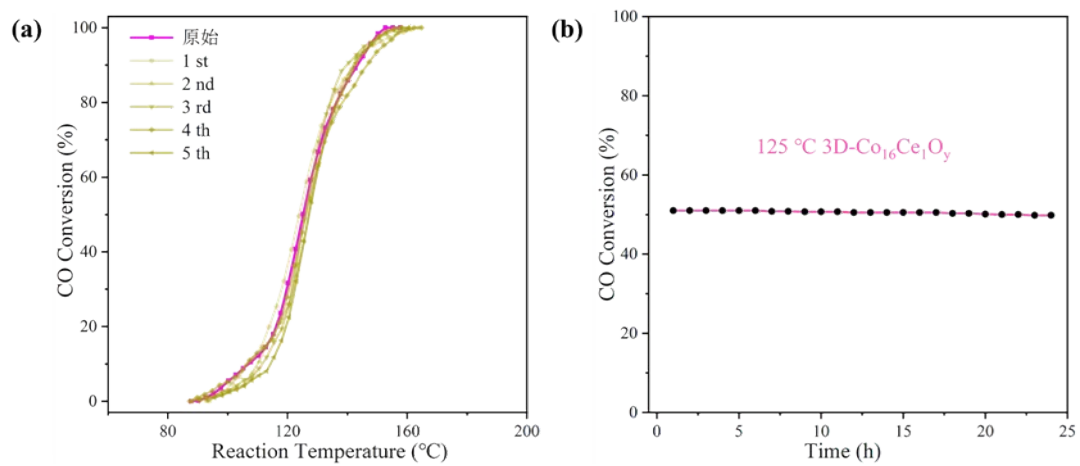


Fig. S4. The five-cyclic CO catalytic activity of 3D-Co₁₆Ce₁O_y (a); the CO conversion of 3D-Co₁₆Ce₁O_y continuous reaction at 125°C for 24 h (b). Reaction conditions: Catalysts (0.1 g), 1 vol.% CO/10 vol.% O₂/89 vol.% N₂ with a total flow of 100 ml min⁻¹.

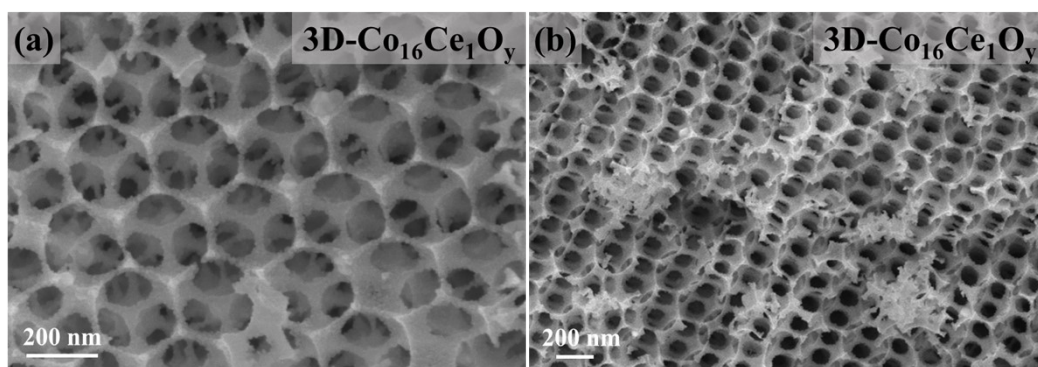


Fig. S5. The SEM of 3D-Co₁₆Ce₁O_y after five cycles (a); the SEM of 3D-Co₁₆Ce₁O_y after continuous reaction at 125°C for 24 h (b).

Table S1 Literature on CO catalytic activity of other transition metal and Co-based catalysts.

Types	Sample	Reaction conditions	Catalyst (mg)	T ₅₀ (°C)	Ref
Transition metal catalysts	Ce _{0.9} Fe _{0.1} O ₂	1.0 vol% CO/10 vol% O ₂ balanced with Ar; 50 ml min ⁻¹ SV= 30,000 ml (g h)	100	188	1
	7NiO/CeO ₂	1 vol% CO/10 vol% O ₂ balanced with N ₂ ; 100 ml min ⁻¹ SV= 60,000 ml (g h)	100	148	2
	3DOM Mn ₂ O ₃	1 vol% CO/20 vol% O ₂ balanced with N ₂ ; 16.7 ml min ⁻¹ ; SV= 20,000 ml (g h)	50	168	3
	CoZ-i-2.8 (Co-modified ZSM-5)	1 vol% CO/ 1 vol% O ₂ balanced with He; 50 ml min ⁻¹ ; SV=2040 ml (g h)	250	170	4
Co-based catalysts	Co ₃ O ₄ -DMA (MOFs)	1.0 vol% CO/20 vol% O ₂ balanced with N ₂ ; 50 ml min ⁻¹ ; SV= 60,000 ml (g h)	50	160	5
	Co-SiO ₂ -m	1 vol% CO/ 1 vol% O ₂ balanced with He; 10 ml min ⁻¹ ; SV=2040 ml (g h)	250	145	6
	1.7Co/2Ce/Z	1.0 vol% CO/1 vol% O ₂ balanced with He; 10 ml min ⁻¹ ; SV=2040 ml (g h)	250	135	7
	10% Ni/LaCoO ₃	0.5 vol.% CO/7.5 10 vol.% O ₂ balanced with He; 50 ml min ⁻¹	100	142	8
	0.5%AuCoCe	1.0 vol% CO/10 vol% O ₂ SV= 30,000 ml (g h) balanced with N ₂ ; 50 ml min ⁻¹ ; SV=100,000 ml (g h)	30	139	9
This work	3D-Co ₁₆ Ce ₁ O _y	1 vol% CO/10 vol% O ₂ balanced with N ₂ ; 100 ml min ⁻¹ SV= 60,000 ml (g h)	100	124.8	This work

Table S2 The energy levels of *d*-band center of Co atoms in 3D-Co₃O₄ and 3D-Co₁₆Ce₁O_y.

Sample	E _{ads} O ₂ (eV)	d _{O-O} (Å)	E _{ads} CO (eV)	d _{C-O} (Å)	Spin up (eV)	Spin down (eV)
3D-Co ₃ O ₄ (eV)	-0.679	1.32	-0.957	1.1442	-2.824	-0.841
3D-Co ₁₆ Ce ₁ O _y (eV)	-0.773	1.30	-1.267	1.1441	-3.098	-0.682

References:

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