Supplementary data

Co/Cu-MFFs derived mesoporous ternary metal oxide microcubes for enhancing the catalytic activity of the CO oxidation reaction

HuijunSong,[abc] Li Zhang,*[abcd] GuanchengXu,[abc] Chi Zhang,[abc] Xin Ma,[abc] Lu Zhang,[abc] DianzengJia*[abc]

[a] Key Laboratory of Energy Materials Chemistry (Xinjiang University), Ministry of Education, Urumqi, Xinjiang, 830046, P. R. China.E-mail:zhanglixju@163.com, jdz0991@gmail.com; Fax: +86-991-8580586; Tel: +86-991-8580586.

[b] Key Laboratory of Advanced Functional Materials, Autonomous Region, Urumqi, Xinjiang, 830046, P. R. China.

[c] Institute of Applied Chemistry, Urumqi, Xinjiang, 830046, P. R. China.

[d] Physics and Chemistry Detecting Center, Xinjiang University, Urumqi, Xinjiang, 830046, P. R. China.

*Corresponding author. E-mail:zhanglixju@163.com, jdz0991@gmail.com. Tel./Fax: +86-991-8580586

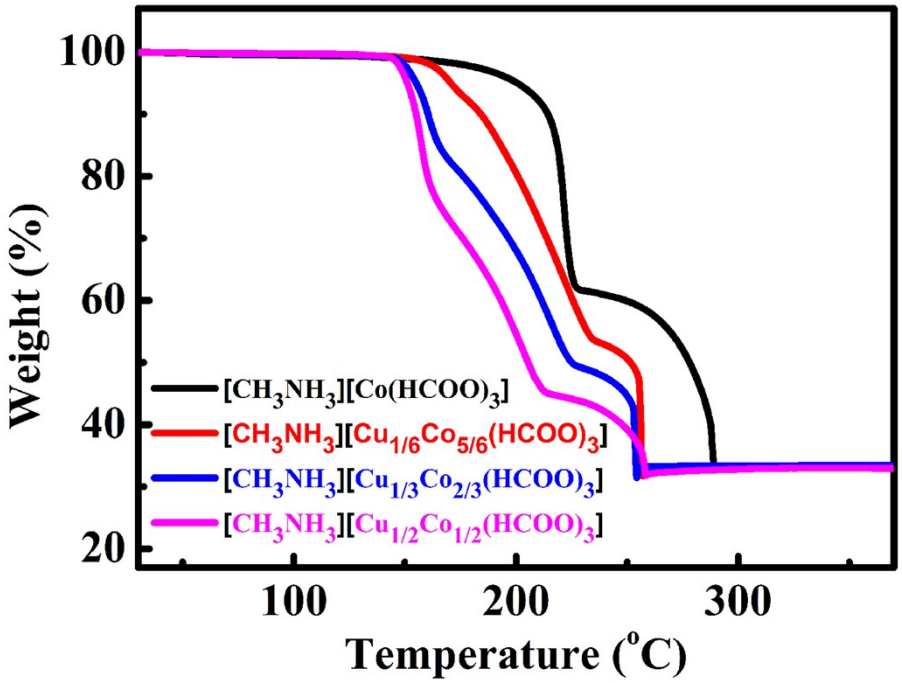

Fig. S1 TGA curves of as-prepared precursors under air flow.

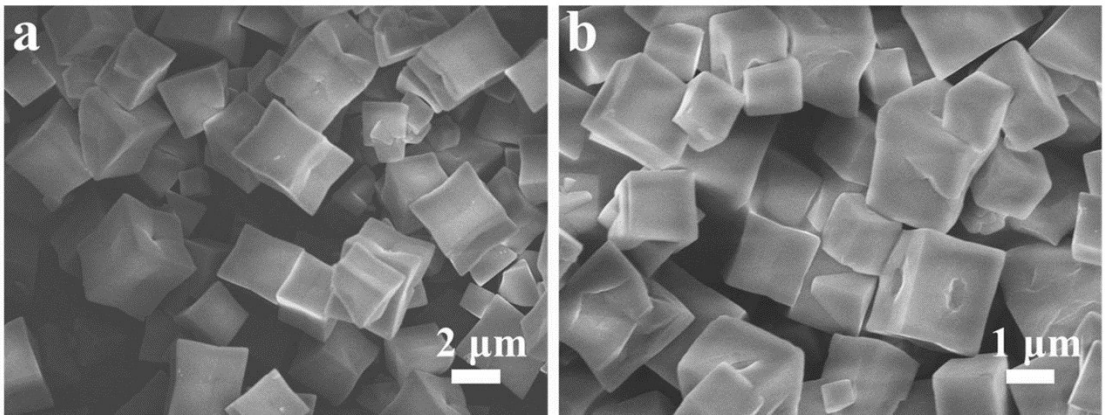

Fig. S2 SEM images of $[CH_3NH_3][Co(HCOO)_3]$ (a) and $[CH_3NH_3][Cu_{1/3}Co_{2/3}(HCOO)_3]$ (b).

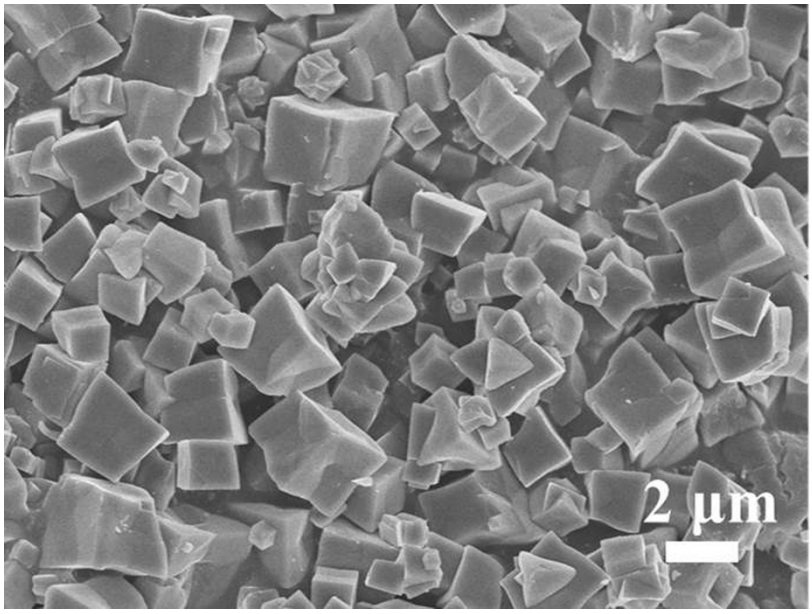

Fig. S3 SEM images of $[CH_3NH_3][Co(HCOO)_3]$ preprared in the absence of PVP-K30.

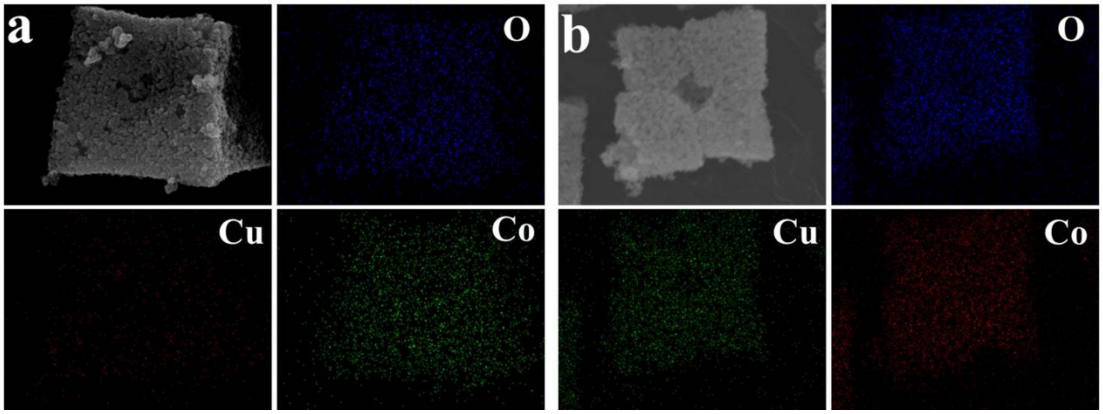

Fig. S4 SEM–EDX mapping images of $Cu_{0.5}Co_{2.5}O_4$ (a) and $Cu_{1.5}Co_{1.5}O_4$ (b).

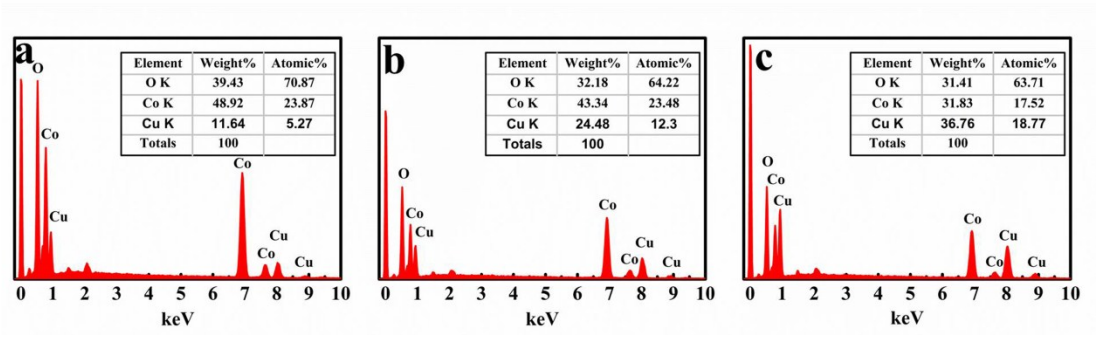

Fig. S5 EDX spectrum of $Cu_{0.5}Co_{2.5}O_4$ (a), $CuCo_2O_4$ (b) and $Cu_{1.5}Co_{1.5}O_4$ (c).

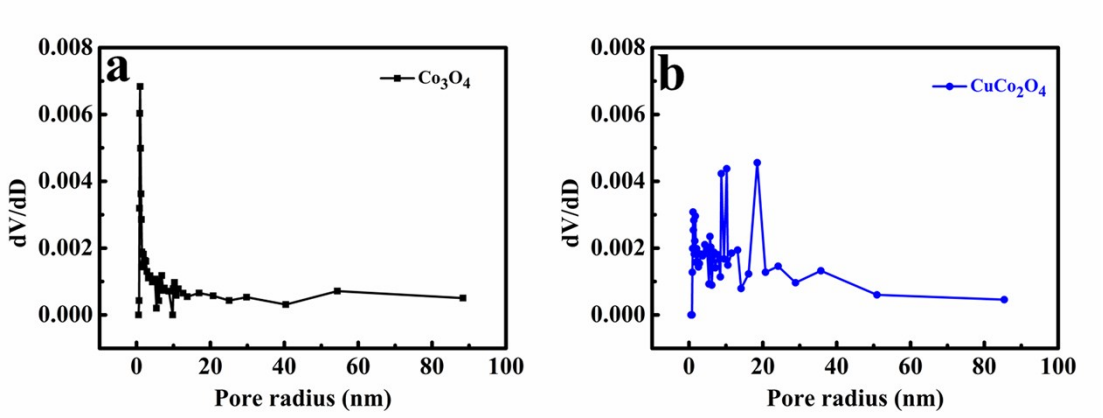

Fig. S6 Barrett-Joyner-Halenda (BJH) pore size distribution plots of Co_3O_4 (a) and $CuCo_2O_4$ (b)

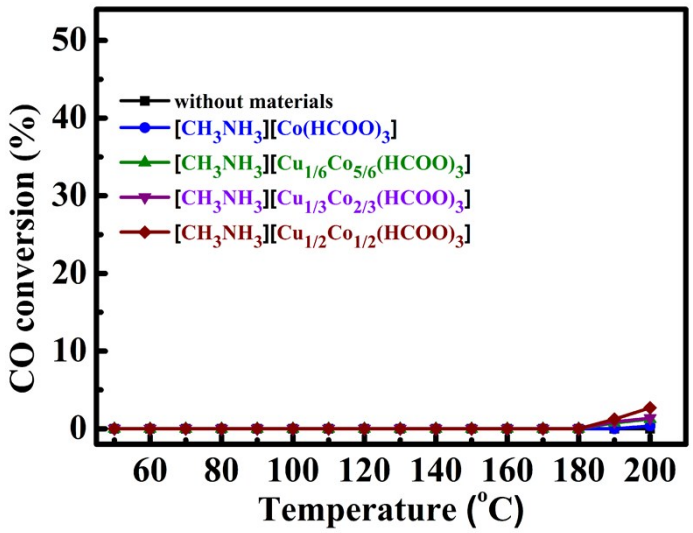

Fig. S7 CO oxidation conversions of without materials and with 50 mg of precursors performed under different temperatures.

Table S1 The measured Cu/Co atomic ratio of $Cu_xCo_{3-x}O_4$ by SEM-EDX, ICP and the calculated Cu/Co atomic ratio in the preparation of precursors.

Sample	Preparations of precursors			Cu/Co atomic ratio measured by	
	$Co(NO_3)_2·6H_2O$ (mmol)	$Cu(NO_3)_2·3H_2O$ (mmol)	Calculated Cu/Co atomic ratio	EDX	ICP
Co_3O_4	1	0	0	0	0
$Cu_{0.5}Co_{2.5}O_4$	5/6	1/6	0.2	0.22	0.235
$CuCo_2O_4$	2/3	1/3	0.5	0.52	0.574
$Cu_{1.5}Co_{1.5}O_4$	1/2	1/2	1	1.07	1.147

Table S2 The activity of transition metal oxides as catalysts for CO oxidation reported in this work and other reference.

Catalyst	The temperature of full CO conversion	Ref.
Co_3O_4	170 °C	Zhang et al.[1]
$Cu/CuO_x/C$	155 °C	Zhang et al.[2]
$Co_3O_4\_Cu_2$ (Cu/Co = 1/4)	120 °C	Zhou et al.[3]
α-Fe_2O_3	255 °C	Cui et al.[4]
Co_3O_4	140 °C	This work
$CuCo_2O_4$	120 °C	This work

Table S3 Specific surface area and Co^{2+}/Co^{3+} atomic ratio of pure Co_3O_4 reported in this work and reference.

Sample	Specific surface area (m^2 g^{-1})	Co^{2+}/Co^{3+} atomic ratio	Ref.
Co_3O_4 nanocube	6.37	1.05	Zhang et al.[1]
Co_3O_4 nanocube	9.37	1.47	Zhang et al.[1]
Co_3O_4 nanocube	25.59	0.627	This work

References

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[2] R. Zhang, L. Hu, S. Bao, R. Li, L. Gao, R. Li, Q. Chen, J. Mater. Chem. A, 2016, 4, 8412-8420.

[3] M. Zhou, L. Cai, M. Bajdich, M. García-Melchor, H. Li, J. He, J. Wilcox, W. Wu, A. Vojvodic, X. Zheng, ACS Catal., 2015, 5, 4485-4491.

[4] L. Cui, D. Zhao, Y. Yang, Y. Wang, X. Zhang, J. Solid State Chem., 2017, 247, 168-172.