Supporting Information

Engineering PtCu Nanoparticles for Highly Efficient Methanol Electro-oxidation Reaction

Pengfei Yao[a,b], Jing Cao[a,b], Mingbo Ruan[a], Ping Song[a], Xue Gong[a], Ce Han[a], Weilin Xu[a,b,*]

[a]State Key Laboratory of Electroanalytical Chemistry, Jilin Province Key Laboratory of Low Carbon Chemical Power, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences 5625 Renmin Street, Changchun, Jilin， 130022, P. R. China.
[b]University of Science and Technology of China, Hefei, Anhui, 230026, P. R. China
***Email: weilinxu@ciac.ac.cn**

Supporting figures and table

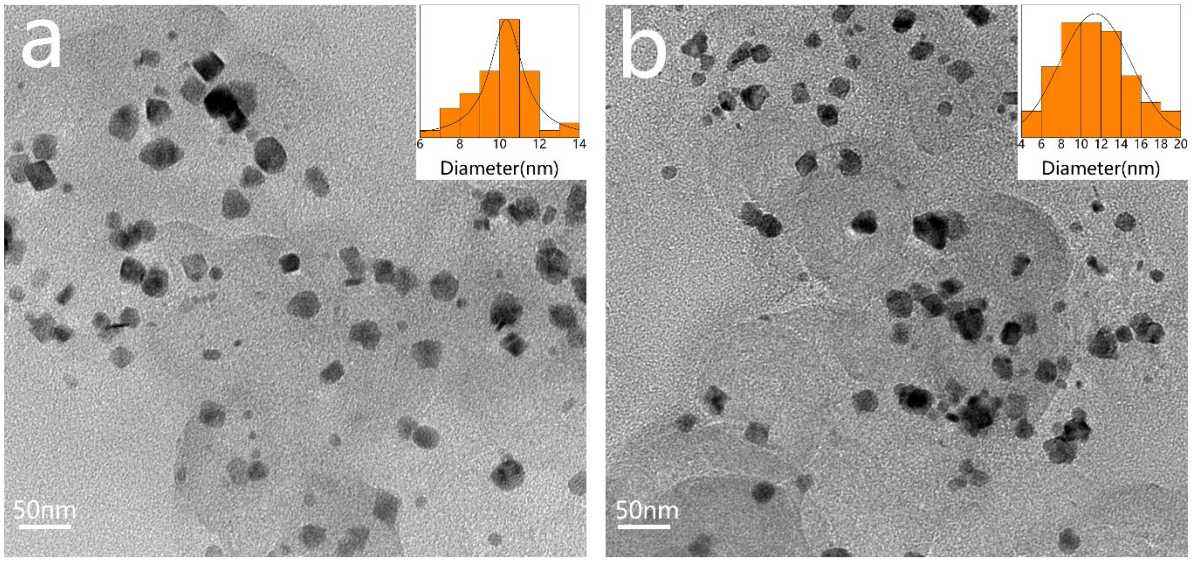

Figure S1. TEM image of **a.** PtCu/C and **b.** Pt_3Cu/C.

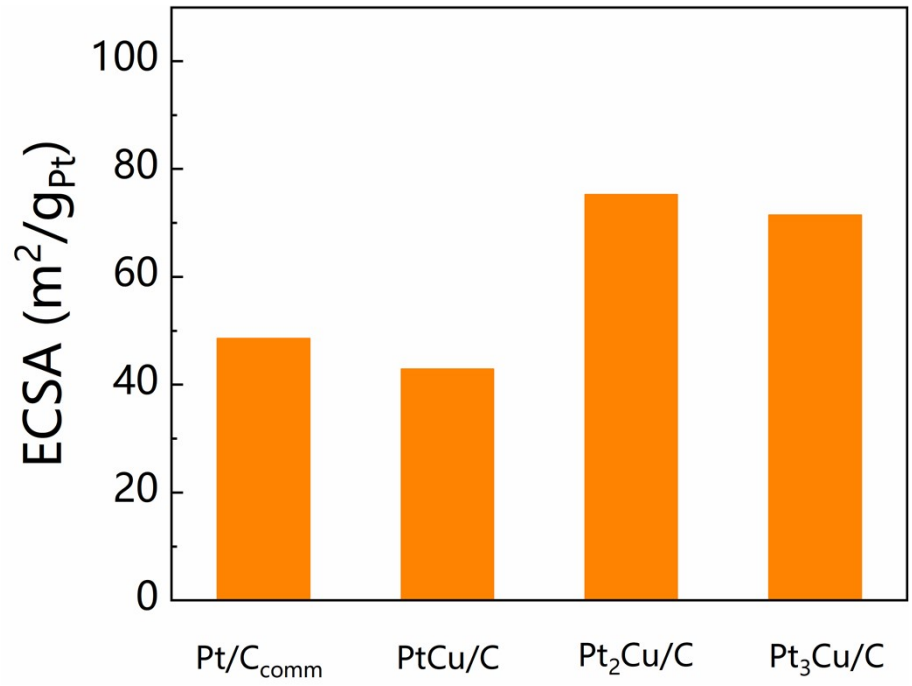

Figure S2. The ECSA of different catalysts calculated based on H_{UPD} region.

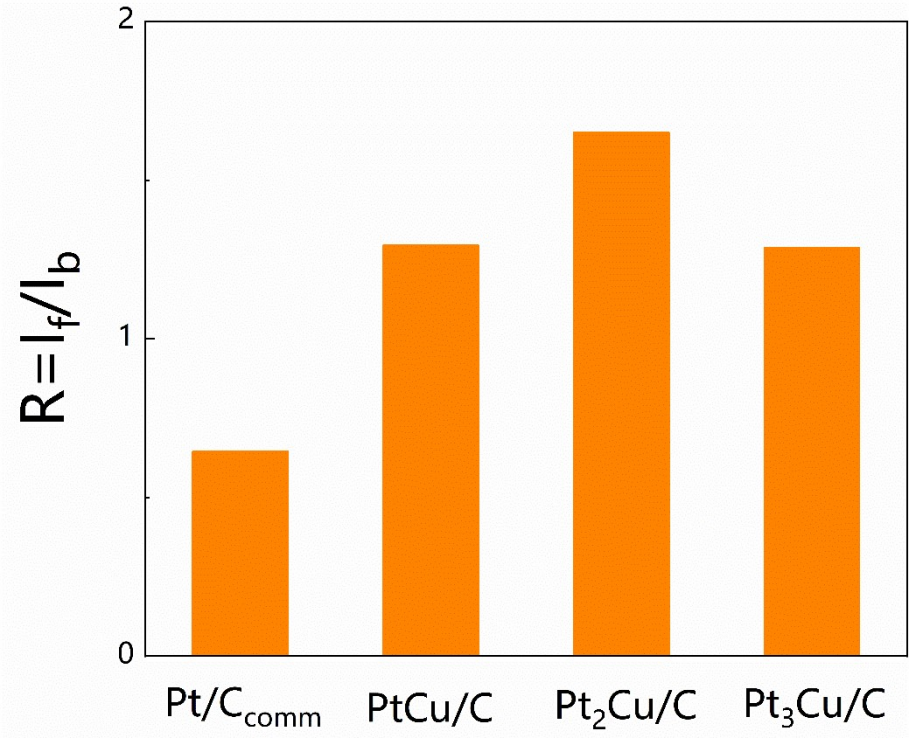

Figure. S3 I_f/I_b values of different catalysts.

Table S1. MOR performance of PtCu bimetallic electrocatalysts published in recent year.

Catalysts	Mass activity (A/mg_{Pt})	Specific activity (mA/cm^2)	Journal/year
PtCu Alloy	4.1	5.4	in this work
Porous Pt-Cu[1]	0.3	1.7	Chem.-Eur. J. 2021
PtCu nanodendrite[2]	3.1	2.7	Chem. Comm. 2020
Hollow PtCu nanoring[3]	2.2	5.2	J. Mater. Chem. A 2020
PtCu octahedral[4]	0.5	2.5	Catal. Sci. Technol. 2020
PtCu alloy nanoclusters[5]	1.3	1.8	Electrochim. Acta, 2019
PtCu octahedral[6]	1.4	4.1	Nanoscale, 2018
PtCu nanotube[7]	2.3	6.1	Energy Environ. Sci.,2017
PtCu Nanoframe[8]	0.2	1.7	Adv. Mater.,2016

Reference

1 Wang, Y.; Yu, H. Z.; Ying, J.; Tian, G.; Liu, Y.; Geng, W.; Hu, J.; Lu, Y.; Chang, G. G.; Ozoemena, K. I.; Janiak, C.; Yang, X. Y., *Chem-Eur J* 2021, ***27***, 9124-9128.

2 Song, T.; Xue, H.; Guo, N.; Sun, J.; Qin, L.; Guo, L.; Huang, K.; He, F.; Wang, Q., *Chem. Commun.* 2020, ***56***, 7136-7139.

3 Shi, Y.; Fang, Y.; Zhang, G.; Wang, X.; Cui, P.; Wang, Q.; Wang, Y., *J. Mater. Chem. A* 2020, ***8***, 3795-3802.

4 Polani, S.; Shviro, M.; Shokhen, V.; Zysler, M.; Gluesen, A.; Dunin-Borkowski, R.; Carmo, M.; Zitoun, D., *Catal Sci Technol* 2020, ***10***, 5501-5512.

5 Zhong, J. P.; Li, L. L.; Waqas, M.; Wang, X. Q.; Fan, Y. J.; Qi, J. H.; Yang, B.; Rong, C. Y.; Chen, W.; Sun, S. G., *Electrochim. Acta* 2019, ***322***, 134677-134685.

6 Li, C.; Liu, T.; He, T.; Ni, B.; Yuan, Q.; Wang, X., *Nanoscale* 2018, ***10***, 4670-4674.

7 Li, H. H.; Fu, Q. Q.; Xu, L.; Ma, S. Y.; Zheng, Y. R.; Liu, X. J.; Yu, S. H., *Energy Environ. Sci.* 2017, ***10***, 1751-1756.

8 Zhang, Z. C.; Luo, Z. M.; Chen, B.; Wei, C.; Zhao, L.; Chen, J. Z.; Zhang, X.; Lai, Z. C.; Fan, Z. X.; Tan, C. L.; Zhao, M. T.; Lu, Q. P.; Li, B.; Zong, Y.; Yan, C. C.; Wang, G. X.; Xu, Z. J. C.; Zhang, H., *Adv. Mater.* 2016, ***28***, 8712-8717.