

Supporting Information

Significant promotion effects of Ag oxide to Pd catalyst for ethanol and methanol oxidation reactions

Ruijie Liu, Si Si, Huashuai Hu, Chongbin Wang, Yuanyuan Feng*

Key laboratory of Life-organic Analysis, College of Chemistry and Chemical Engineering, Qufu

Normal University, Qufu Shandong, 273165, China

*Corresponding author: Prof. Yuan-Yuan Feng

E-mail: yfeng@mail.tsinghua.edu.cn

Table. S1 The actual loading and chemical composition of the Pd_mAg/C samples

Samples	Loading of Pd	Loading of Ag	Atomic Pd/Ag ratio
Pd _{0.05} Ag/C	0.43%	8.78%	0.049
Pd _{0.1} Ag/C	0.87%	8.46%	0.104
Pd _{0.5} Ag/C	4.43%	8.74%	0.514
Pd _{1.0} Ag/C	8.76%	8.98%	0.988
Pd/C	8.93%	0	
Ag/C	0	9.02%	

Table. S2 Comparison of the catalytic activity of Pd_{0.5}Ag/C, PtRu/C and the AgPd catalysts previously reported in literature

Catalyst	Electrolyte	Current density (mA mg ⁻¹ _{Pd})	Reference
Pd _{0.5} Ag/C	0.5 M KOH + 2.0 M C ₂ H ₅ OH	8688	This work
	0.5 M KOH + 2.0 M CH ₃ OH	2475	
Pt ₁ Ru ₁ /C	1.0 M KOH + 1.0 M C ₂ H ₅ OH	3731	1
Pd ₅₀ Ag ₅₀	1.0 M KOH + 1.0 M C ₂ H ₅ OH	1970	2
Pd-Ag/G	1.0 M KOH + 1.0 M C ₂ H ₅ OH	5200	3
Pd ₁ Ag ₃ -HNs	1.0 M KOH + 1.0 M C ₂ H ₅ OH	1615.9	4
Pd/Ag-BP-30%	1.0 M KOH + 1.0 M C ₂ H ₅ OH	6410.8	5
Pd-Ag/GNs	1.0 M KOH + 1.0 M CH ₃ OH	595	6
Pd-Ag(1:1)/RGO	1.0 M KOH + 1.0 M C ₂ H ₅ OH	1601	7
	1.0 M KOH + 1.0 M CH ₃ OH	630	

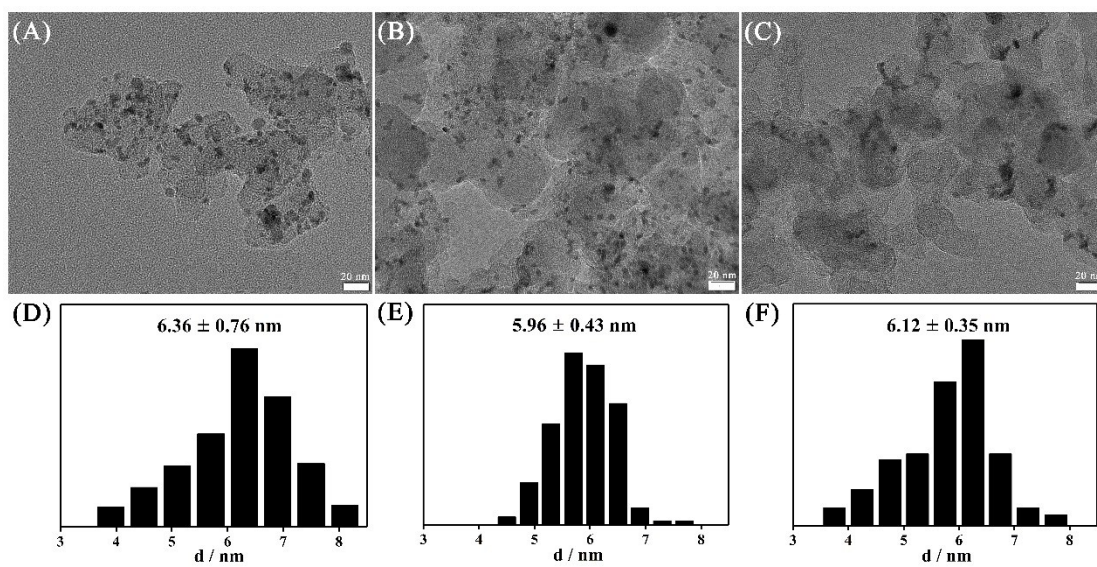
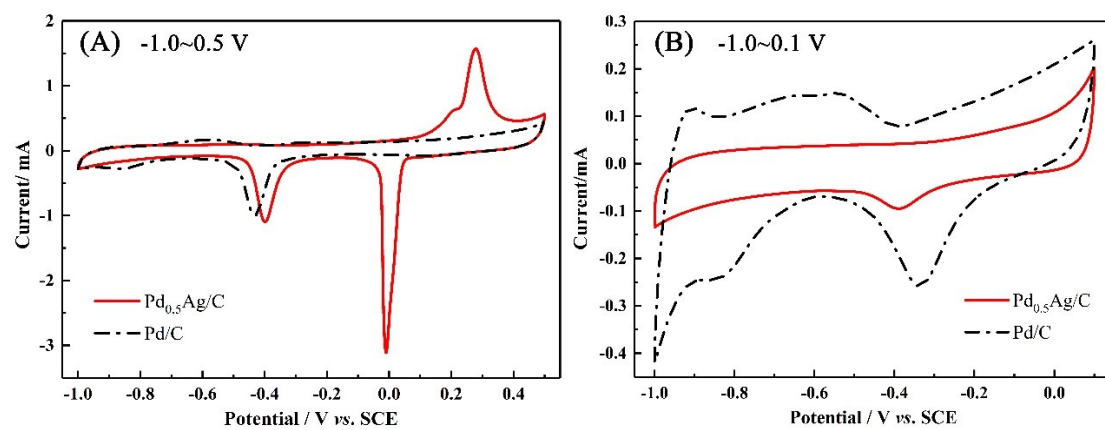


Figure. S1 TEM images of (A)Pd_{0.05}Ag/C, (B)Pd_{0.1}Ag/C and (C)Pd_{1.0}Ag/C samples. (D-F) show the corresponding size histograms for the metal particles.

Figure. S2 CV curves of Pd_{0.5}Ag/C and Pd/C electrocatalysts in 0.5 M KOH. The potential range was -1.0 ~ 0.5 V (A) and -1.0 ~ 0.1 V (B).



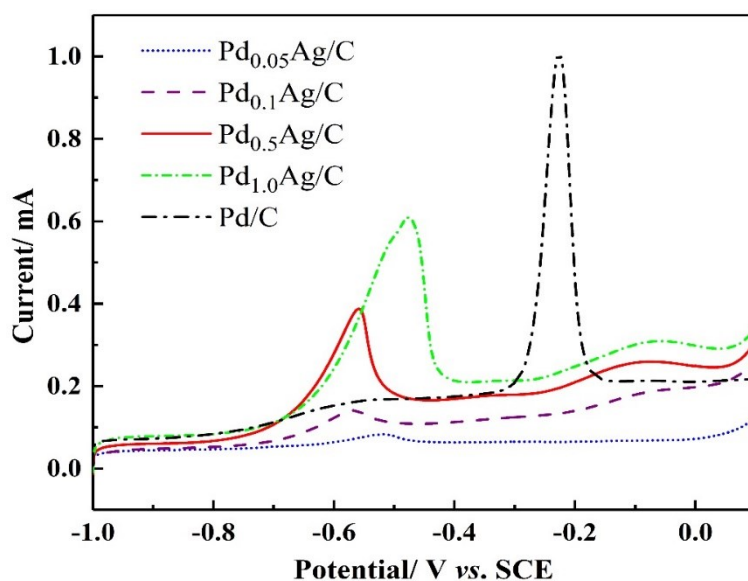


Figure. S3 CO stripping voltammograms of Pd_mAg/C and Pd/C catalysts in 0.5 M KOH, scan rate 50 mV s⁻¹

References:

1. Z. Gu, S. Li, Z. Xiong, H. Xu, F. Gao and Y. Du, *J. Colloid Interface Sci.*, 2018, **521**, 111-118.
2. S. Fu, C. Zhu, D. Du and Y. Lin, *ACS Appl. Mater. Interfaces.*, 2015, **7**, 13842-13848.
3. A. S. Douk, H. Saravani, M. Farsadrooh and M. Noroozifar, *Ultrason. Sonochem.*, 2019, **58**, 104616.
4. D. Bin, B. Yang, K. Zhang, C. Wang, J. Wang, J. Zhong, Y. Feng, J. Guo and Y. Du, *Chem. - Eur. J.*, 2016, **22**, 16642-16647.
5. T. Wu, Y. Ma, Z. Qu, J. Fan, Q. Li, P. Shi, Q. Xu and Y. Min, *ACS Appl. Mater. Interfaces*, 2019, **11**, 5136-5145.
6. Z. Li, L. Ye, Y. Wang, S. Xu, F. Lei and S. Lin, *RSC Advances*, 2016, **6**, 79533-79541.
7. L. Li, M. Chen, G. Huang, N. Yang, L. Zhang, H. Wang, Y. Liu, W. Wang and J. Gao, *J. Power Sources*, 2014, **263**, 13-21.

