Supporting Information for

Hyperbranched PdRu nanospine assemblies: an efficient electrocatalyst for formic acid oxidation

Hongjing Wang, Yinghao Li, Chunjie Li, Ziqiang Wang, You Xu, Xiaonian Li,

Hairong Xue*, Liang Wang*

State Key Laboratory Breeding Base of Green-Chemical Synthesis Technology, College of Chemical Engineering, Zhejiang University of Technology, Hangzhou, Zhejiang 310014, P. R. China

*Corresponding authors:

E-mails: xuehairong@zjut.edu.cn; wangliang@zjut.edu.cn

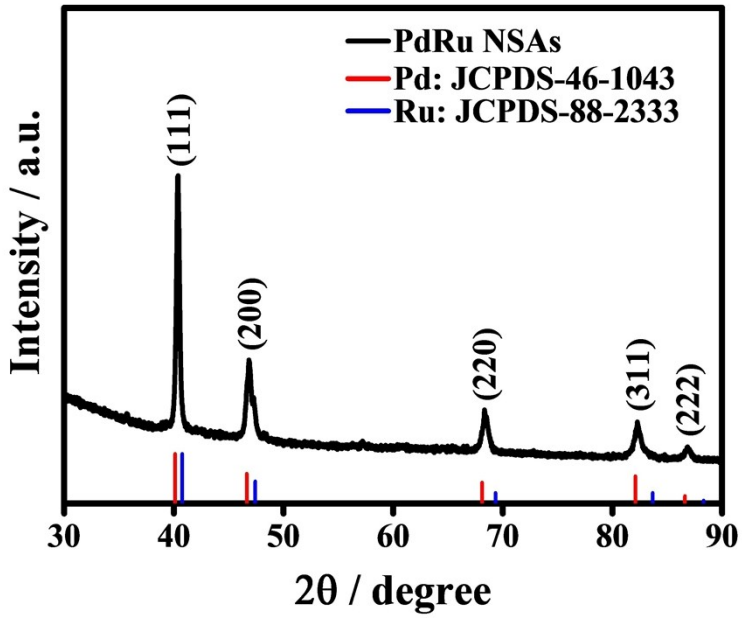

Fig. S1 XRD pattern of the PdRu NSAs.

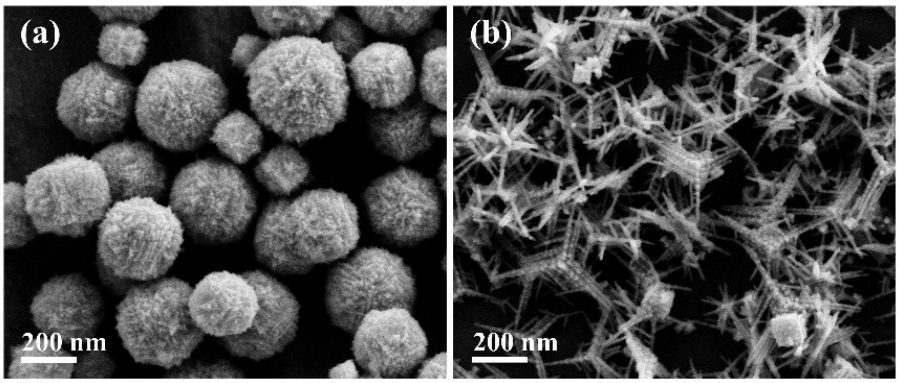

Fig. S2 SEM images of the samples prepared with different amounts of KBr under the typical synthesis: (a) 0 mg, (b) 10 mg.

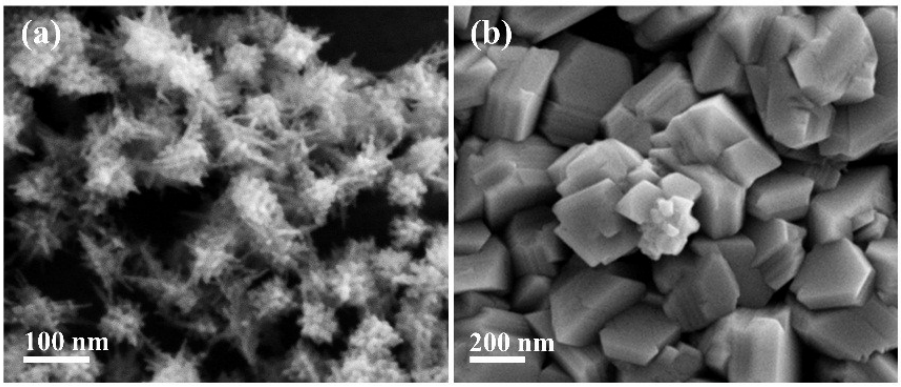

Fig. S3 SEM images of the samples prepared by replacing KBr with (a) KCl and (b) KI, respectively, under the typical synthesis.

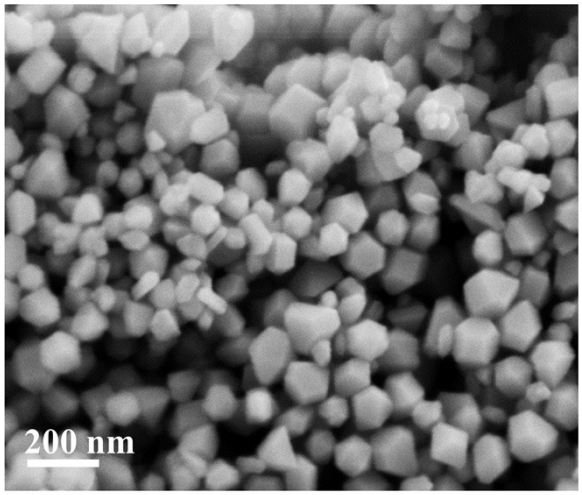

Fig. S4 SEM image of Pd nanoparticles (Pd NPs) prepared without $RuCl_3$ under the typical synthesis.

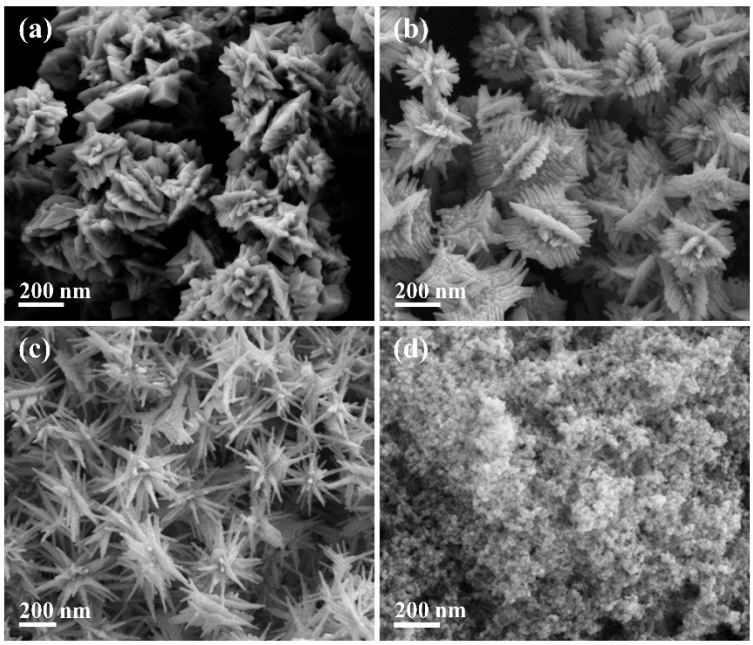

Fig. S5 SEM images of the samples prepared with the different molar ratio of the Pd/Ru precursors under the typical synthesis. The added metallic precursor amounts of Na_2PdCl_4 and $RuCl_3$ are (a) 2.25 mL and 0.75 mL, (b) 1.5 mL and 1.5 mL, (c) 0.4 mL and 2.6 mL, and (d) 0.2 mL and 2.8 mL respectively.

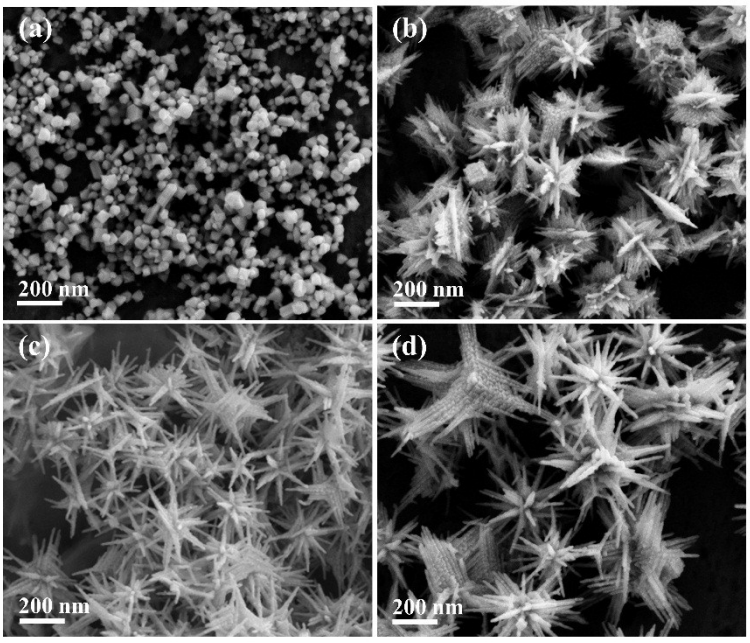

Fig. S6 SEM images of the samples prepared with different amounts of HCl under the typical synthesis: (a) 0 mL, (b) 0.05 mL, (c) 0.1 mL, (d) 0.2 mL.

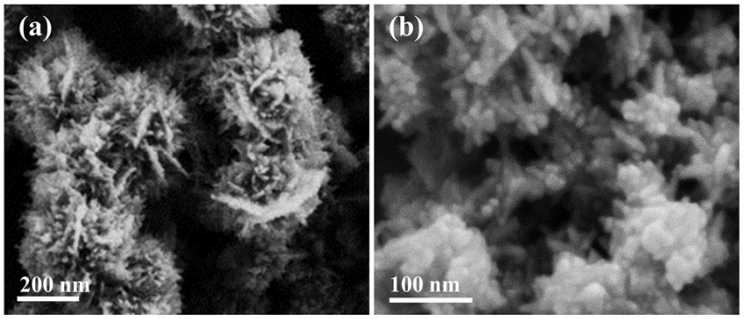

Fig. S7 SEM images of the samples prepared (a) without F127 and (b) with PVP, respectively, under the typical synthesis.

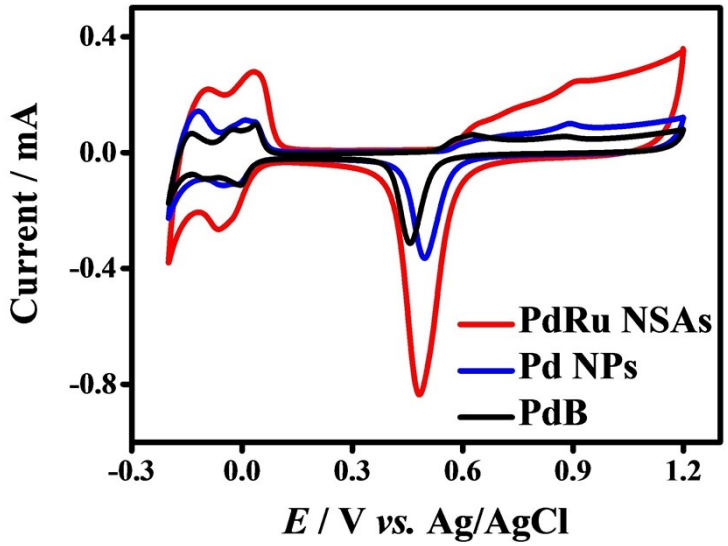

Fig. S8 CV curves of the catalysts in 0.5 M H_2SO_4 solution.

Table S1. The comparisons of the FOR performance of the catalysts.

Catalyst	Condition	Mass activity ($mA\ mg^{-1}$)	Ref.
PdRu NSAs	**0.5 M H_2SO_4+ 0.5 M HCOOH**	**1105.8**	**Current work**
Mesoporous Pd Films	0.5 M H_2SO_4+ 0.5 M HCOOH	934.6	1
Porous Pd Nanosheets	0.5 M H_2SO_4+ 0.5 M HCOOH	409.3	2
Pd arrow- headed tripods	0.5 M H_2SO_4+ 0.5 M HCOOH	493.0	3
Mesoporous Pd nanoparticles	0.5 M H_2SO_4+ 0.5 M HCOOH	735.6	4
3D super-branched PdCu	0.5 M H_2SO_4+ 0.5 M HCOOH	808.0	5
PdNi hollow nanocrystals	0.5 M H_2SO_4+ 0.5 M HCOOH	768.0	6
Bi-modified palladium nanotubes	0.5 M H_2SO_4+ 0.5 M HCOOH	397.0	7
Pd-Ag alloy hollow nanostructures	0.1 M $HClO_4$ + 0.1 M HCOOH	602.8	8
CuPd@Pd tetrahedra	0.5 M H_2SO_4+ 0.5 M HCOOH	501.8	9
Pd nanosheets	0.1 M $HClO_4$ + 0.2 M HCOOH	634.3	10
PtAgCu@PtCu	0.5 M H_2SO_4+ 0.5 M HCOOH	314.0	11
Porous PtAg@Pt	0.5 M H_2SO_4+ 0.5 M HCOOH	282.6	12

Reference

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