

Electronic Supplementary Information for

## **Trimetallic PtPdCo mesoporous nanopolyhedra with hollow cavities**

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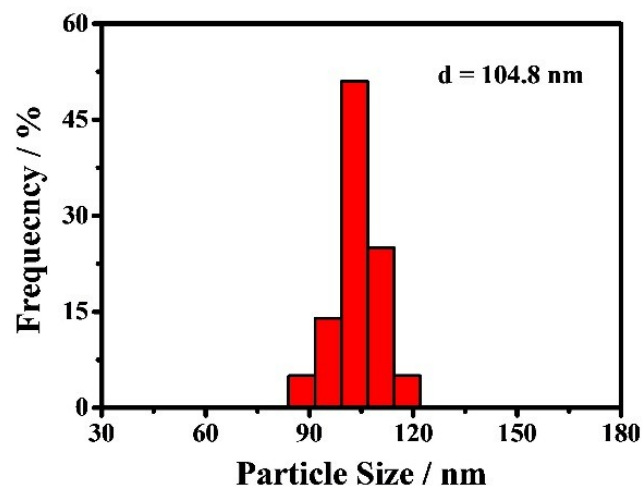


Fig. S1 Particle size distribution histogram of the Pd@PtPdCo MNPs.

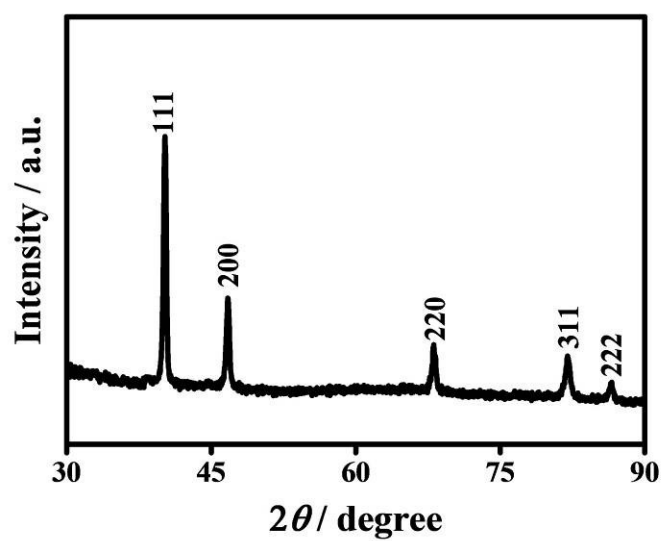
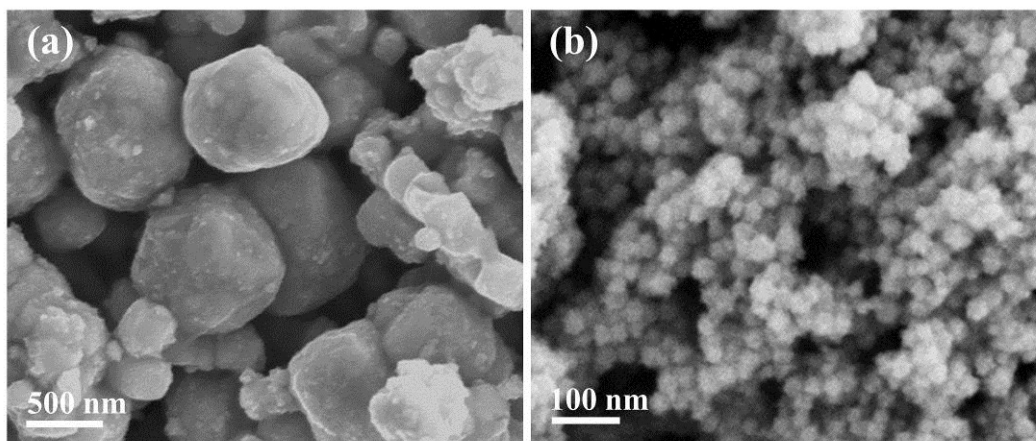
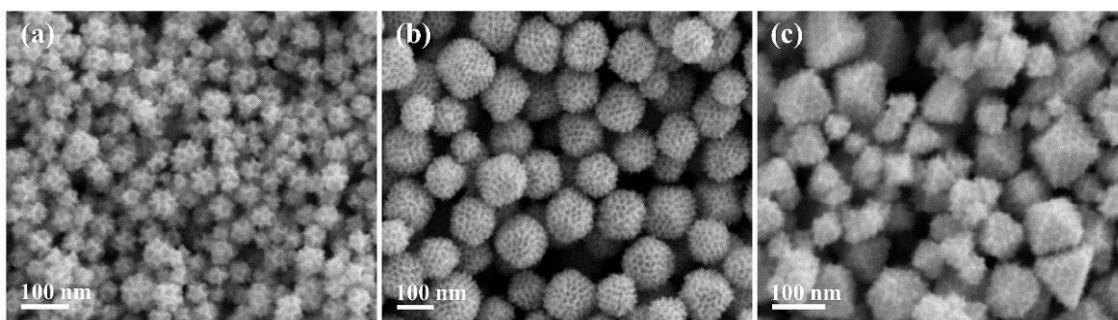


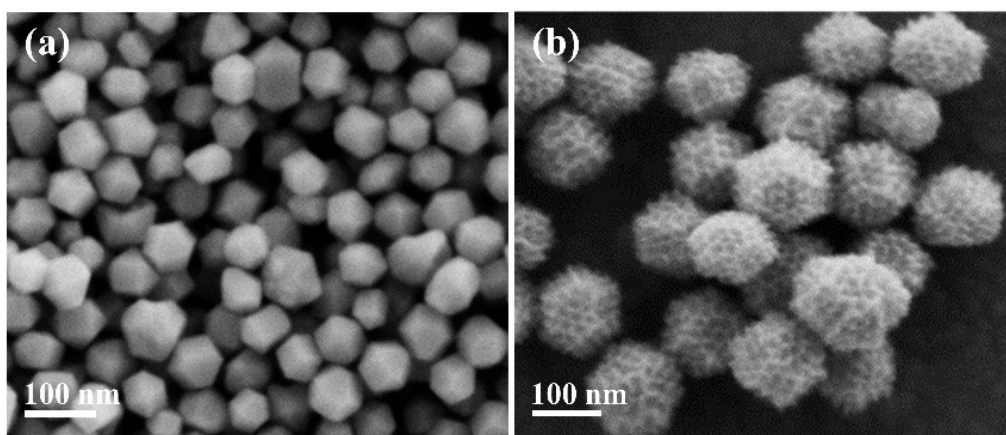
Fig. S2 XRD pattern of the Pd@PtPdCo MNPs.



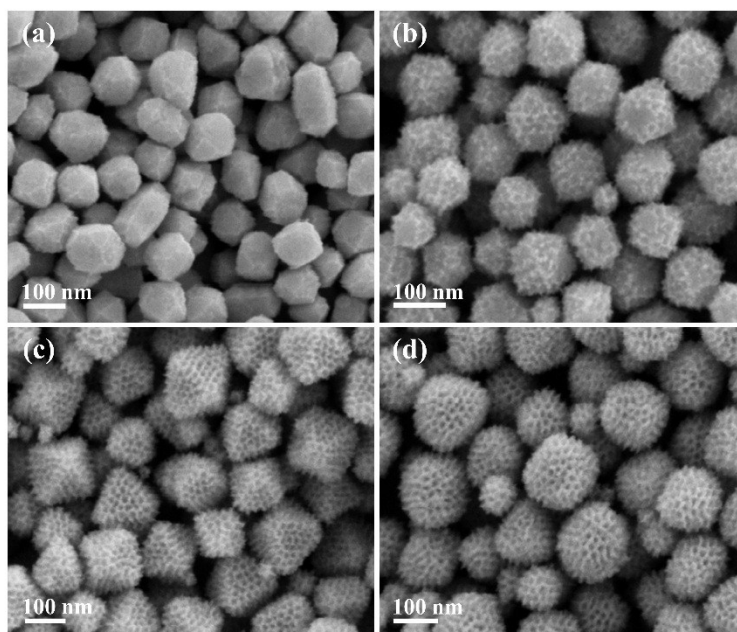
**Fig. S3** SEM images of the samples prepared under the typical conditions without F127 (a) and by replacing F127 with PVP (b)



**Fig. S4** SEM images of the samples prepared with different amounts of HCl under the typical synthesis: (a) 0 mL, (b) 0.1 mL, (c) 0.4 mL.



**Fig. S5** (a) SEM image of the Pd NPs prepared without Pt precursor and Co precursor, and (b) SEM image of the PtPd NPs prepared without Co precursor under identical conditions used for the typical synthesis.



**Fig. S6** SEM images of the samples prepared with the different molar ratio of the Pt/Pd/Co precursors under the typical synthesis. The added amounts of  $\text{H}_2\text{PtCl}_6/\text{Na}_2\text{PdCl}_4/\text{CoCl}_2$  are: (a) 2.4 mL/0.6 mL/1.5 mL, (b) 1.8 mL/1.2 mL/1.5 mL, (c) 1.2 mL/1.8 mL/1.5 mL, and (d) 0.6 mL/2.4 mL/1.5 mL.

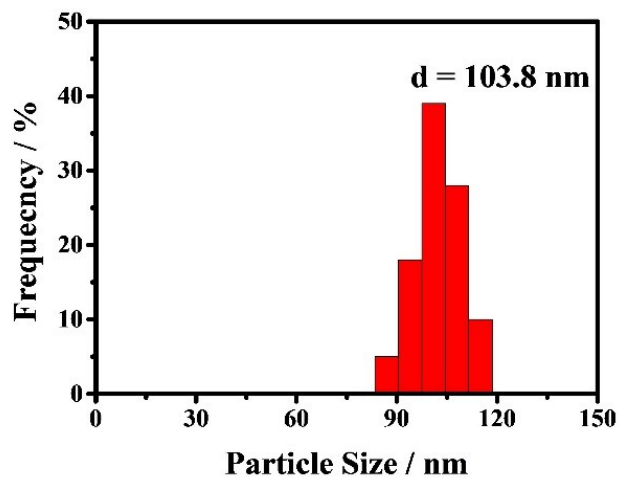


Fig. S7 Particle size distribution histogram of the PtPdCo MNPs.

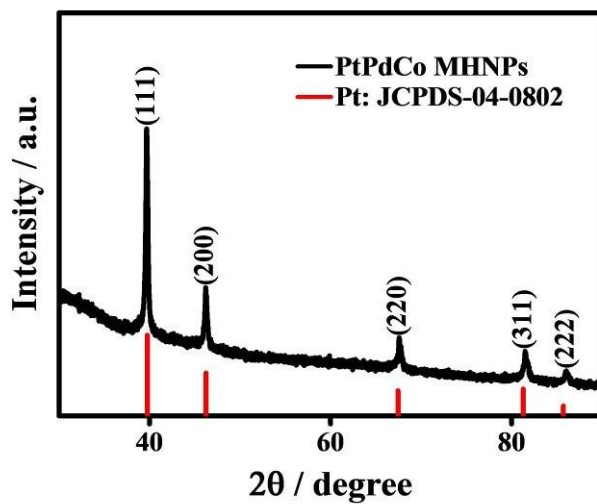
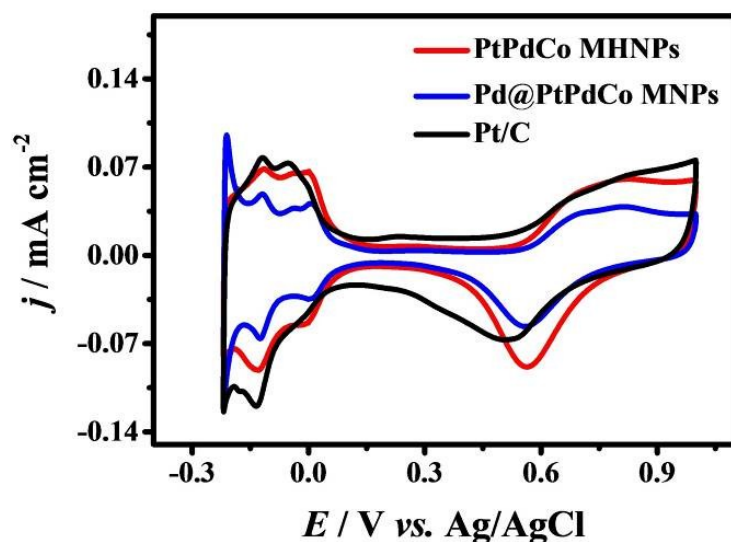
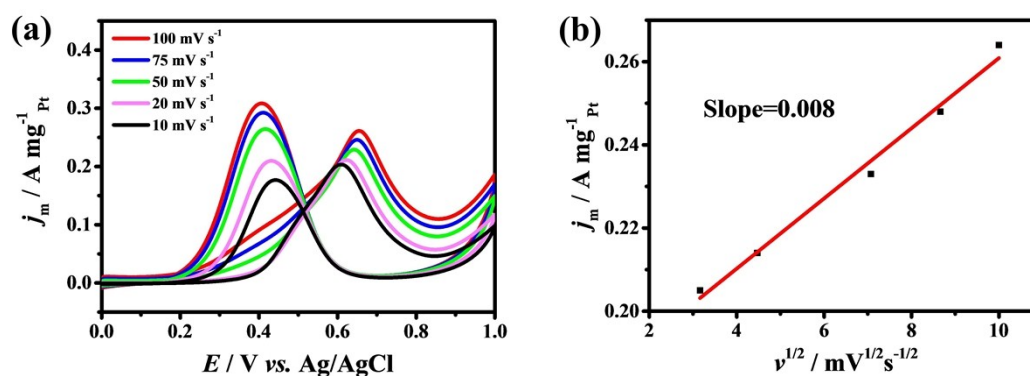


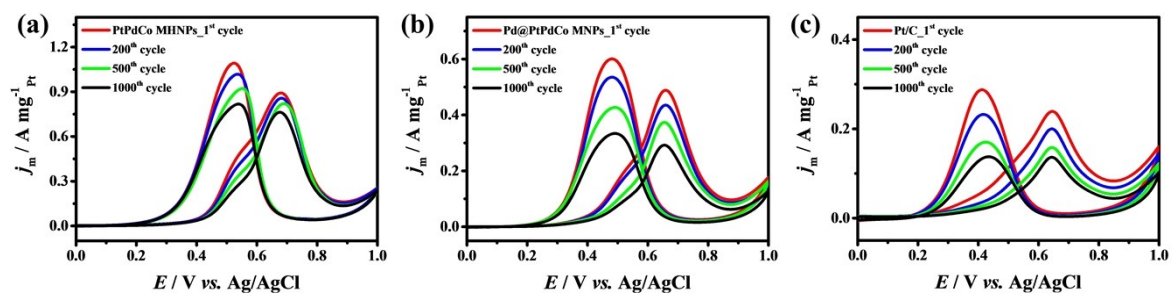
Fig. S8 XRD pattern of the PtPdCo MNPs.



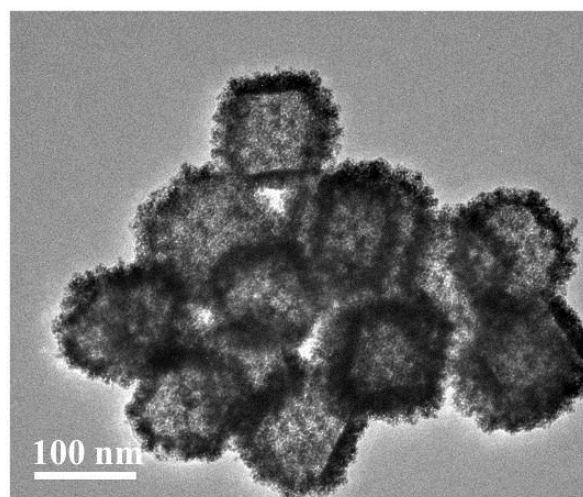
**Fig. S9** CV curves of the catalysts recorded in a  $N_2$ -saturated 0.5 M  $H_2SO_4$  solution with a scan rate of  $50 \text{ mV s}^{-1}$ .



**Fig. S10** (a) CVs of MOR on Pt/C at different scan rates. (b) The corresponding plot of forward peak current ( $j_m$ ) versus the square root of the scan rate ( $v^{1/2}$ ).



**Fig. S11** CVs of (a) PtPdCo MHNPs, (b) Pd@PtPdCo MNPs and (c) Pt/C for MOR in 0.5 M  $\text{H}_2\text{SO}_4$  containing 1.0 M  $\text{CH}_3\text{OH}$  after different potential cycles.



**Fig. S12** TEM image of the PtPdCo MHNPs after the durability test.

**Table S1.** The mass activity comparison of MOR on various Pt-based electrocatalysts.

Catalysts	Condition	Scan rate (mV s <sup>-1</sup> )	Mass activity (A mg <sup>-1</sup> <sub>Pt</sub> )	Ref.
<b>PtPdCo MHNPs</b>	<b>0.5 M H<sub>2</sub>SO<sub>4</sub> containing 1.0 M CH<sub>3</sub>OH</b>	<b>50</b>	<b>0.91</b>	<b>This work</b>
Pt <sub>95</sub> Co <sub>5</sub> NWs	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.49	1
3D Pt/(LDCNT) <sub>3</sub> - (NG) <sub>7</sub>	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.87	2
Hollow Pt-on-Pd nanodendrites	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.58	3
Octahedra PtAg alloy	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.35	4
Pt <sub>1</sub> Ru <sub>3</sub> nanosponge	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.41	5
Hollow Pd@Pt nanoparticles	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.50	6
Dendritic Au@Pd@Pt nanoparticles	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.43	7
PtPdTe nanowire	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.59	8
Au-Pt nanodendrites	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.45	9
Ultrathin Pt nanowire	0.5 M H <sub>2</sub> SO <sub>4</sub> containing 1.0 M CH <sub>3</sub> OH	50	0.58	10



## References

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