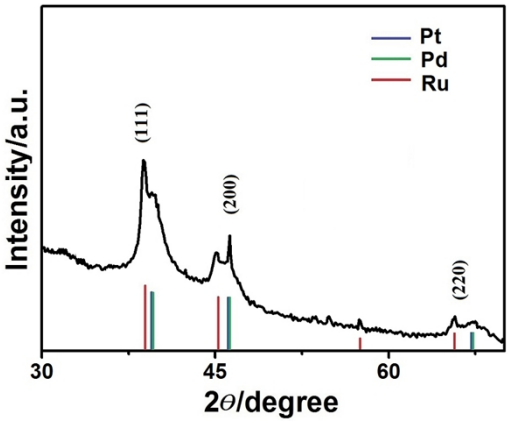

Fig. S1 XRD pattern of the Pt-Pd-Ru nanodendrites. The positions of pure Pt, Pd and Ru at the bottom are taken from the JCPDS database.

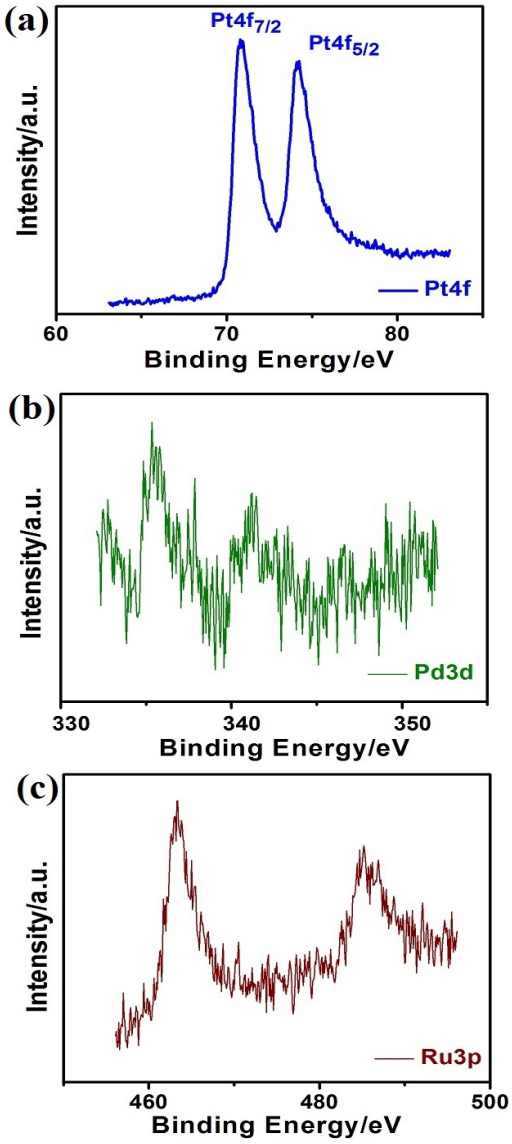

Fig. S2 XPS spectra of the Pt-Pd-Ru nanodendrites centered on Pt *4f* (a), Pd *3d* (b) and Ru *3p* (c).

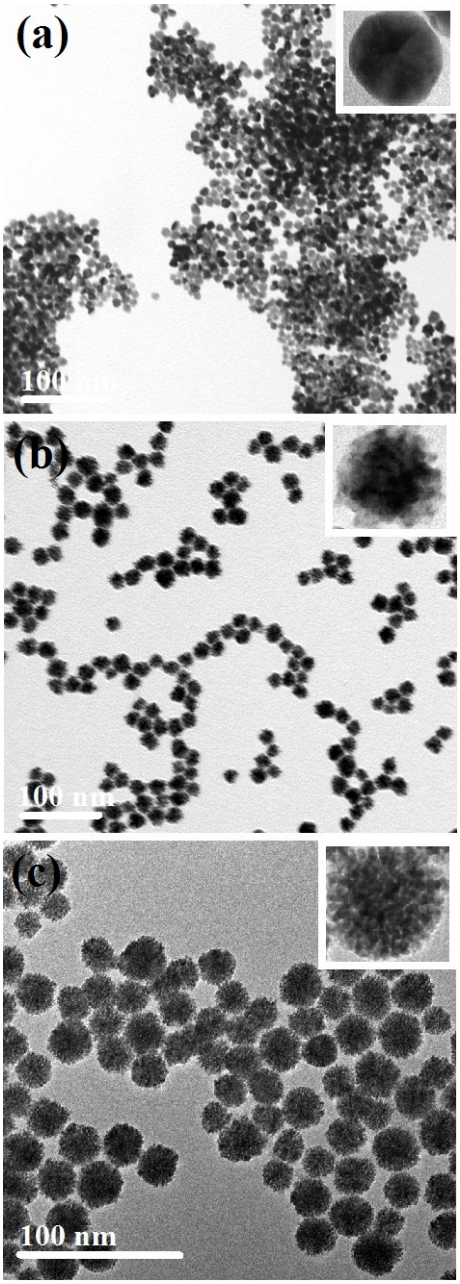

Fig. S3 TEM images of the intermediate samples after (a) 10 seconds, (b) 5 minutes and (c) 10 minutes of reaction, respectively.

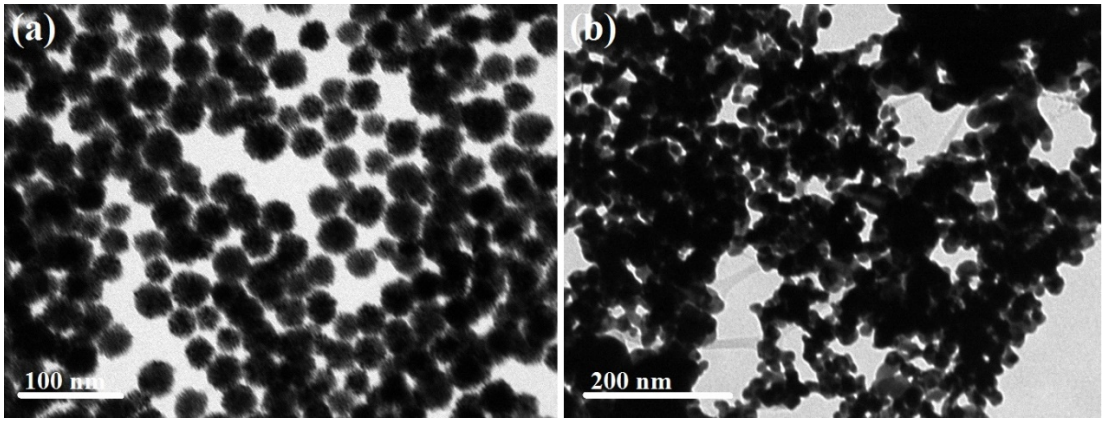

Fig. S4 TEM images of the nanostructures produced by using (a) formic acid and (b) $NaBH_4$ as reducing agents to replace ascorbic acid in the typical synthesis.

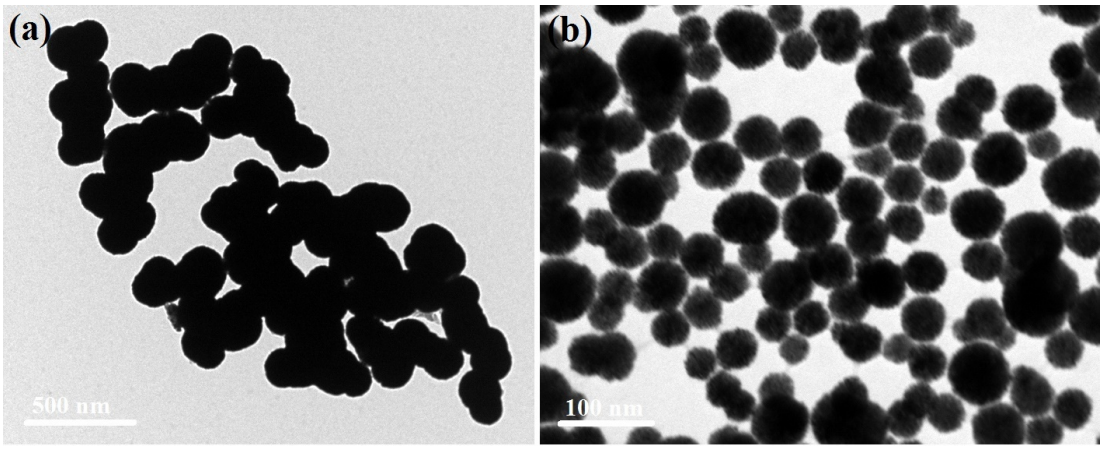

Fig. S5 TEM images of the nanostructures synthesized by using of 0.1 M (a) and 0.2 M (b) AA, respectively, under the typical synthetic condition.

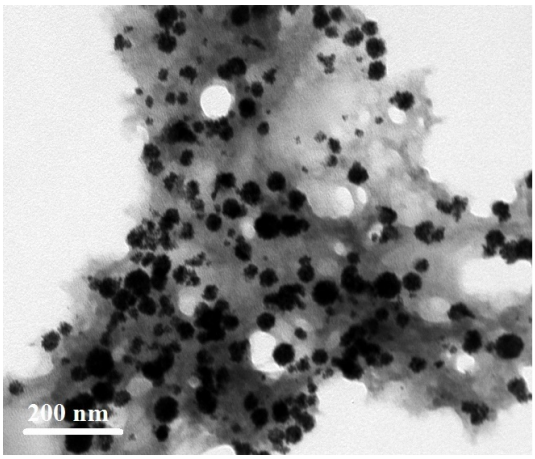

Fig. S6 TEM images of the nanostructures produced by using CTAC as capping agents instead of Pluronic F127 in the typical synthesis.

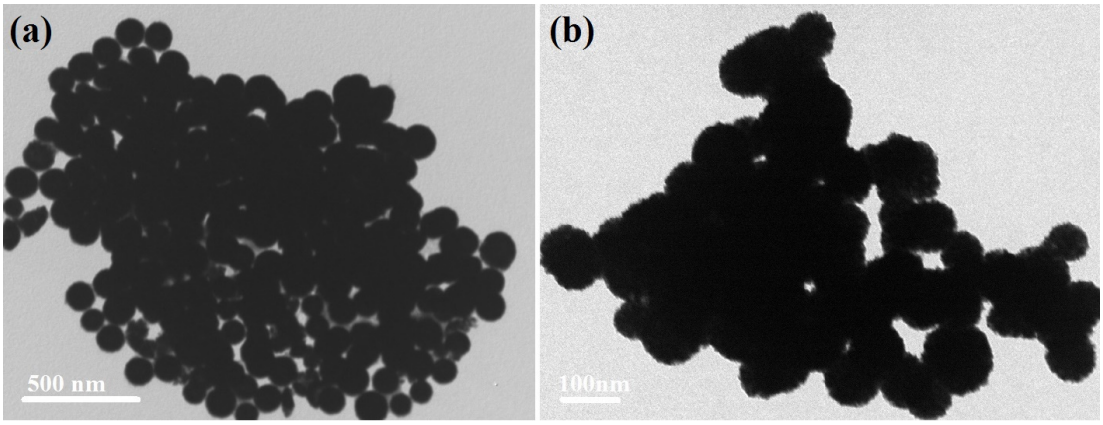

Fig. S7 TEM images of the nanostructures synthesized without (a) and with (b) 0.001 g Pluronic F127, under the typical synthetic condition.

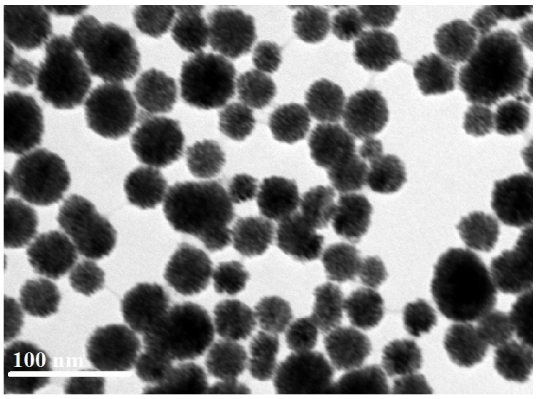

Fig. S8 TEM image of the Pt-Pd-Ru nanodendrites prepared from 10 mM of Pt precursor.

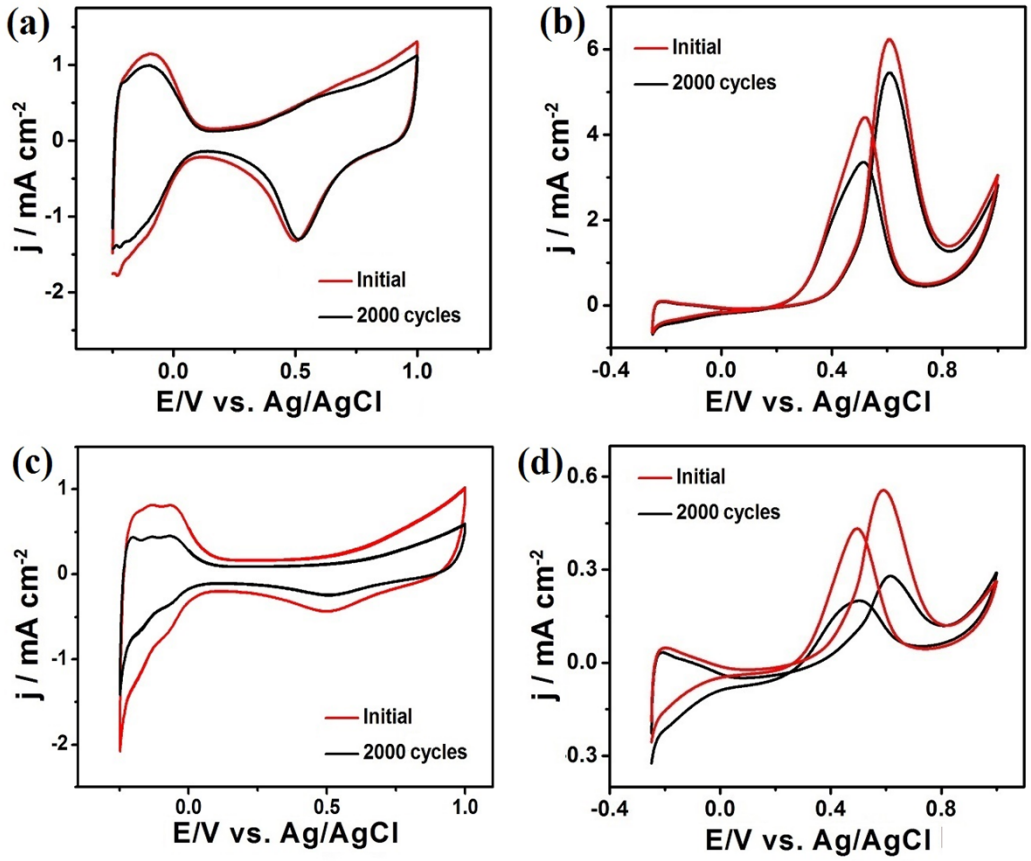

Fig. S9 CVs for durability tests of Pt-Pd-Ru nanodendrites (a and b) and Pt/C (c and d) in 0.1 M $HClO_4$ without (a and c) and with 1 M CH_3OH (b and d) at a scan rate of 50 mV s^{-1}. The current densities are normalized in reference to the geometric area of the working electrode.

Table S1 The comparisons of synthetic routes, morphologies and the MOR mass activities of the Pt-Pd-Ru nanodendrites with the reported trimetallic nanoparticles.

Catalyst	**Synthetic route**	**Electrolyte**	**Mass activity ($mA\ \mu g^{-1}$)**	**Ref.**
Pt-Pd-Ru Nanodenderites	One-step synthesis at room temperature (RT)	0.1 M $HClO_4$ + 1 M CH_3OH	1.82	This work
Au@PdPt	Chemical reduction with AA/Hydrazine followed by heating to 95°C	0.1 M $HClO_4$ + 0.5 M CH_3OH	1.48	1
$Au@Cu_{64}Pt_{36}$	AuNPs was synthesized at RT followed by coating with CuPt via consecutive thermal cycles between 120-200°C	0.1 M $HClO_4$ + 0.1 M CH_3OH	0.44	2
Au@Pd@Pt	Chemical reduction at RT	0.5 M H_2SO_4 + 1 M CH_3OH	0.43	3, 4

Table S2 The comparison of synthetic routes, morphologies and ORR mass activities of Pt-Pd-Ru nanodendrites with the reported trimetallic nanoparticles.

Catalyst	Synthetic method	Electrolyte	Mass activity ($mA.\mu g^{-1}$)	Ref.
Pt-Pd-Ru Nanodenderites	One-step synthesis at RT	0.1 M $HClO_4$	1. 5	This work
$PtPd_{0.85}Bi_{0.15}$ Nanowires **$PtPd_{0.85}Bi_{0.15}$** Nanospheres	Chemical reduction by $NaBH_4$ followed by thermal cycles between 90-200°C	0.5 M $HClO_4$	1.16 0.67	5
$Fe_{10}Pt_{75}Cu_{15}$ Nanorods	Consecutive thermal decomposition cycles till 240°C	0.1 M $HClO_4$	1.034	6
PtNiFe Octahydrans Nanowires Polyhydrans Nanocubes	Thermal decomposition	0.1 M $HClO_4$	 0.553 0.532 0.464 0.335	7
$PtCu_3Co$ Nanospheres **$PtCu_2Co_2$** Nanospheres **$PtCuCo_3$** Nanospheres	Impregnation cu and Co precursors with commercial Pt/C followed by freeze drying then reductive annealing method	0.1 M $HClO_4$	0.49 0.37 0.37	8
CoCuPt Nanospheres	CoNPs was synthesized by reduction with $NaBH_4$ followed by coating with CuPt and annealing to 200°C	0.1 M $HClO_4$	0.15	9

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