Supporting Information

A Convenient Detection System Consisting of Efficient Au@PtRu Nanozymes and Alcohol Oxidase for Highly Sensitive Alcohol Biosensing

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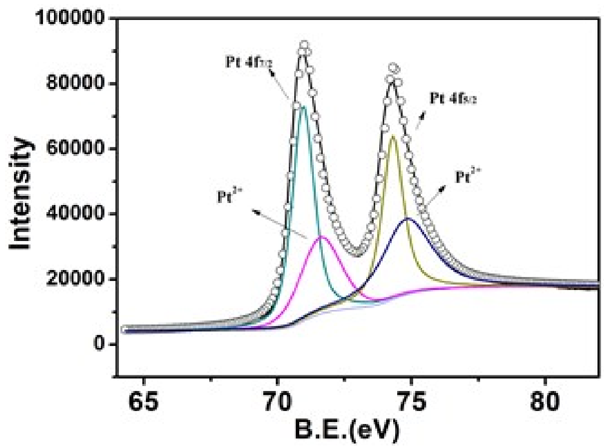

Fig. S1 The XPS results of Pt in Au@PtRu nanorods.

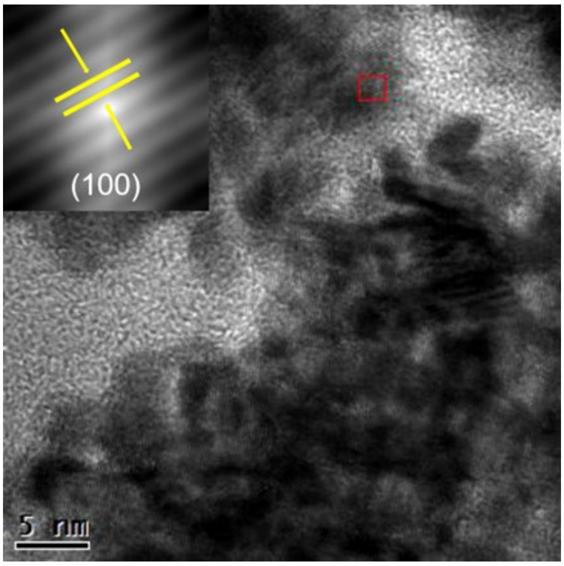

Fig. S2 High-resolution transmission electron microscopy (HRTEM) image of Au@Pt nanorods.

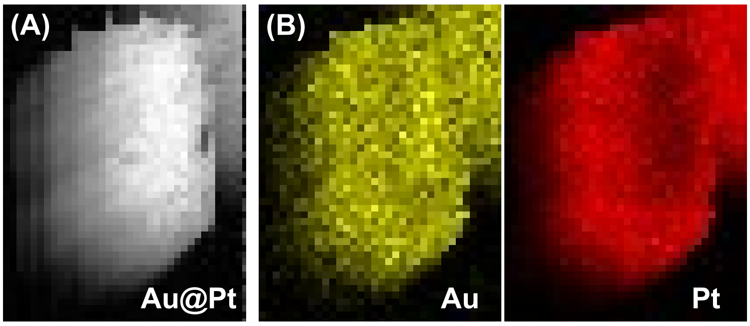

Fig. S3 Scanning TEM (A) and elemental mapping patterns of Au@Pt nanorods (B).

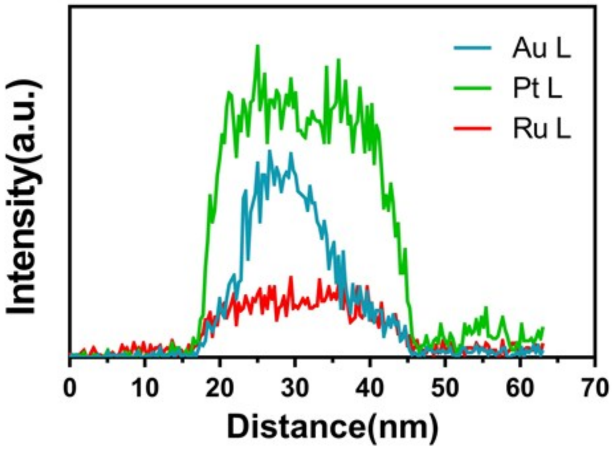

Fig. S4 The compositional line profiles of a single Au@PtRu nanorod.

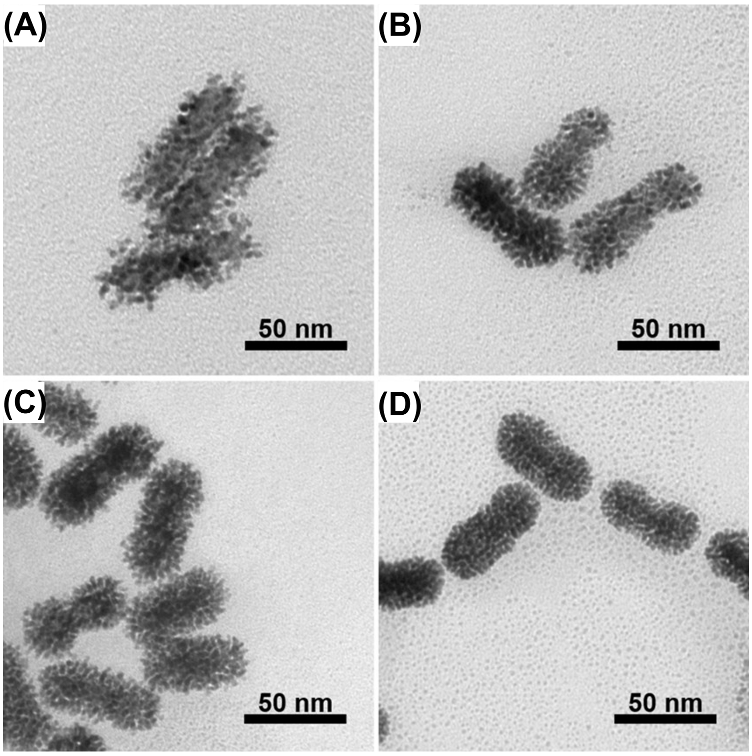

Fig. S5 TEM images of the formation of Au@PtRu nanorods at different time points. (A) 30 min, (B) 60 min, (C) 90 min, (D) 120 min.

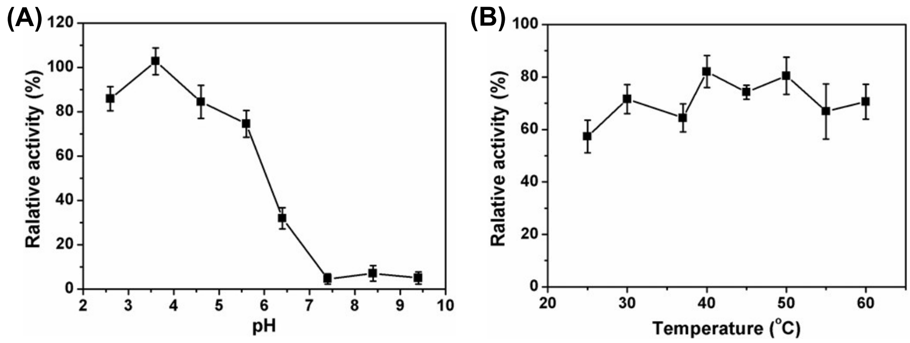

Fig. S6 The effect of pH (A) and temperature (B) on the catalytic activity of Au@PtRu nanorods.

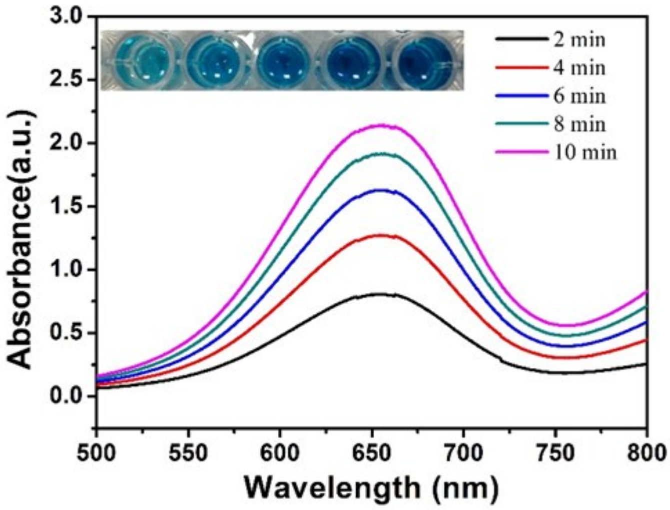

Fig. S7 Time-dependent absorption spectra of TMB catalyzed by Au@PtRu nanorods.

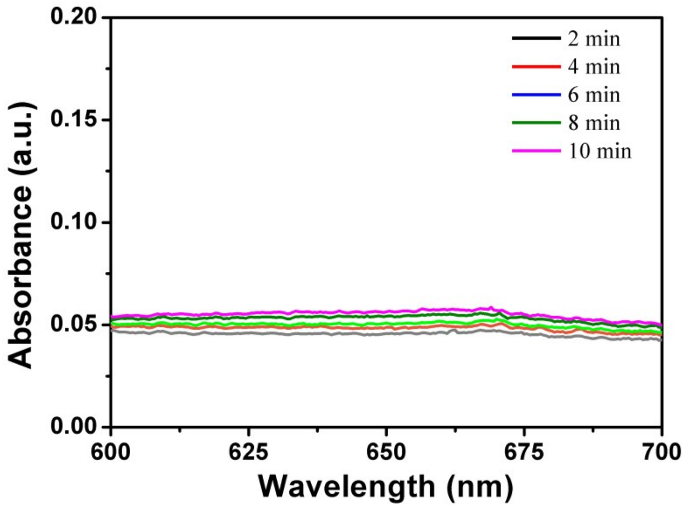

Fig. S8 UV-vis spectra for detection of alcohol oxidase-like activity of Au@PtRu nanorods. The reaction was carried out in 800 μL NaAc-HAc buffer solution (200 mM, pH 3.6), 50 μL ethanol, 50 μL Au@PtRu nanorods (20 μg/mL), and 50 μL TMB (40 mM).

Table S1 Comparison of the kinetic parameters of various catalysts toward the oxidation of TMB by H_2O_2.[a]

Catalyst	Substrate	V_{max} (M s^{-1})	K_m (M)	k_{cat} (s^{-1})	k_{cat}/K_m (s^{-1} M^{-1})	Refs
HRP	TMB	1.0×10^{-7}	4.3×10^{-4}	4.0×10^{3}	9.3×10^{6}	S1
	H_2O_2	8.7×10^{-8}	3.7×10^{-3}	3.5×10^{3}	9.5×10^{5}	
Au@PtRu nanorods	TMB	1.3×10^{-6}	7.0×10^{-4}	3.4×10^{5}	4.9×10^{8}	Present work
	H_2O_2	1.5×10^{-6}	2.3×10^{-1}	4.0×10^{5}	1.7×10^{6}	
Fe_3O_4 naoparticles	TMB	3.4×10^{-8}	9.8×10^{-5}	3.0×10^{4}	3.0×10^{8}	S1
	H_2O_2	9.8×10^{-8}	1.5×10^{-1}	8.6×10^{4}	5.7×10^{5}	
Graphene oxide nanosheets	TMB	3.5×10^{-8}	2.4×10^{-5}	2.9×10^{1}	1.2×10^{6}	S2
	H_2O_2	3.9×10^{-8}	4.0×10^{-3}	3.3×10^{1}	8.2×10^{3}	
Pt nanoparticles	TMB	1.3×10^{-6}	1.2×10^{-4}	2.3×10^{4}	1.9×10^{8}	S3
	H_2O_2	1.9×10^{-6}	7.7×10^{-1}	1.6×10^{4}	2.1×10^{4}	
Pd nanocubes	TMB	9.7×10^{-8}	5.4×10^{-5}	6.9×10^{4}	1.2×10^{9}	S4
	H_2O_2	6.5×10^{-8}	7.0×10^{-1}	4.6×10^{4}	6.6×10^{4}	
Ru nanoparticles	TMB	1.3×10^{-7}	6.0×10^{-5}	1.3×10^{4}	2.2×10^{8}	S5
	H_2O_2	7.4×10^{-8}	3.2×10^{-1}	7.0×10^{3}	2.2×10^{4}	
Fe_2O_3 nanoplates	TMB	3.9×10^{-7}	5.8×10^{-4}	2.1×10^{4}	3.6×10^{7}	S6
	H_2O_2	3.9×10^{-6}	4.5×10^{-1}	2.1×10^{5}	4.7×10^{5}	
Au/Fe_3O_4 nanocubes	TMB	5.9×10^{-7}	4.3×10^{-5}	7.1×10^{2}	1.7×10^{7}	S7
	H_2O_2	4.7×10^{-7}	1.4×10^{-1}	5.7×10^{2}	4.1×10^{3}	

[a)] K_m is the Michaelis constant, V_{max} is the maximal reaction velocity, k_{cat} is the catalytic constant that equals V_{max}/[E], and k_{cat}/K_m is the catalytic efficiency.

References:

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