Electronic Supplementary Material (ESM)

An ordered one-step colorimetric sensor for selective determination of catechol based on the polyacrylic acid-coated cerium oxide with laccase-like activity

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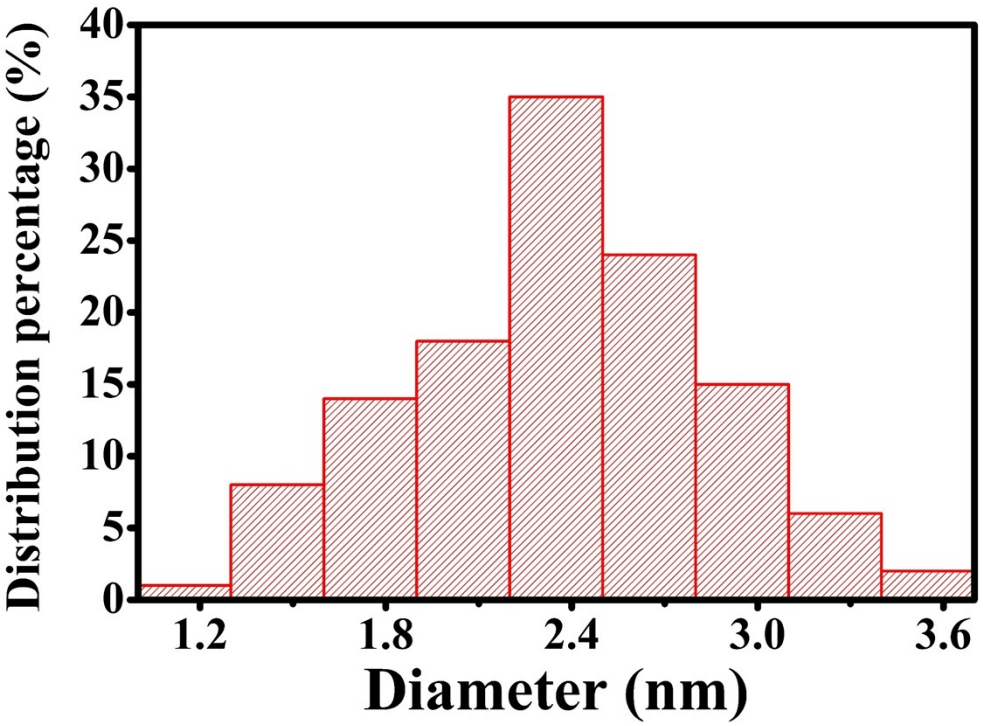

Fig. S1 The Particle size histogram of PAA-CeO_2.

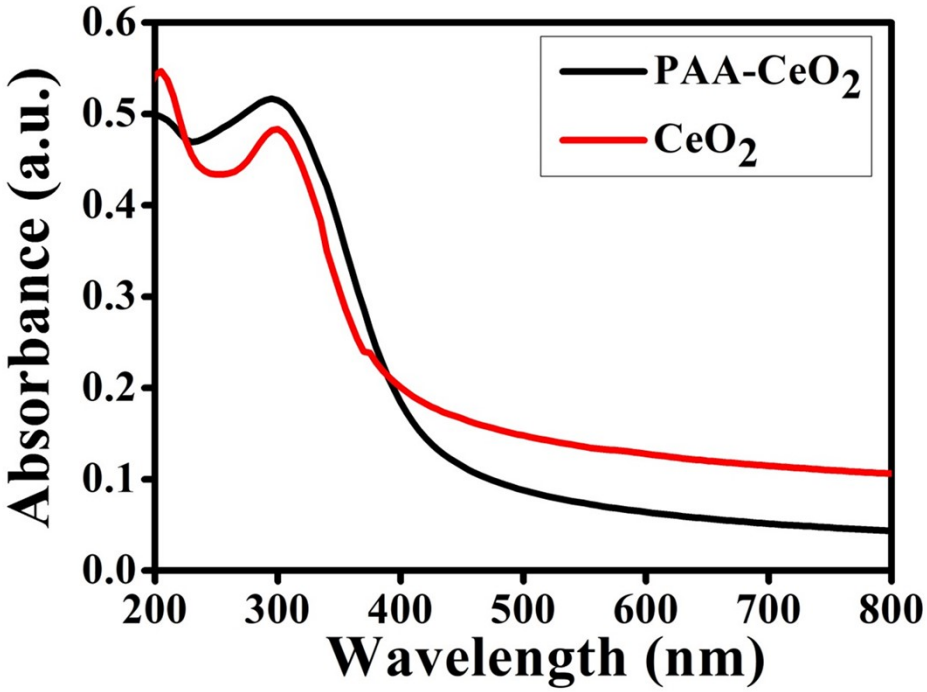

Fig. S2 The UV-Vis absorption spectra of PAA-CeO_2 and CeO_2.

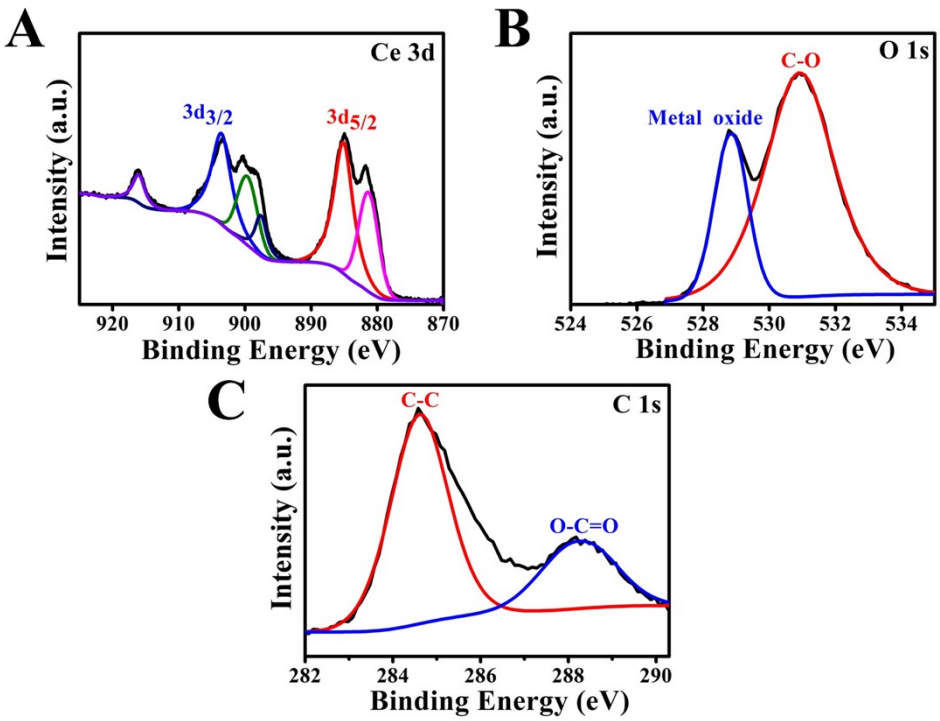

Fig. S3 The high-resolution XPS spectra of PAA-CeO_2, (A) Ce 3d, (B) O 1s, (C) C 1S.

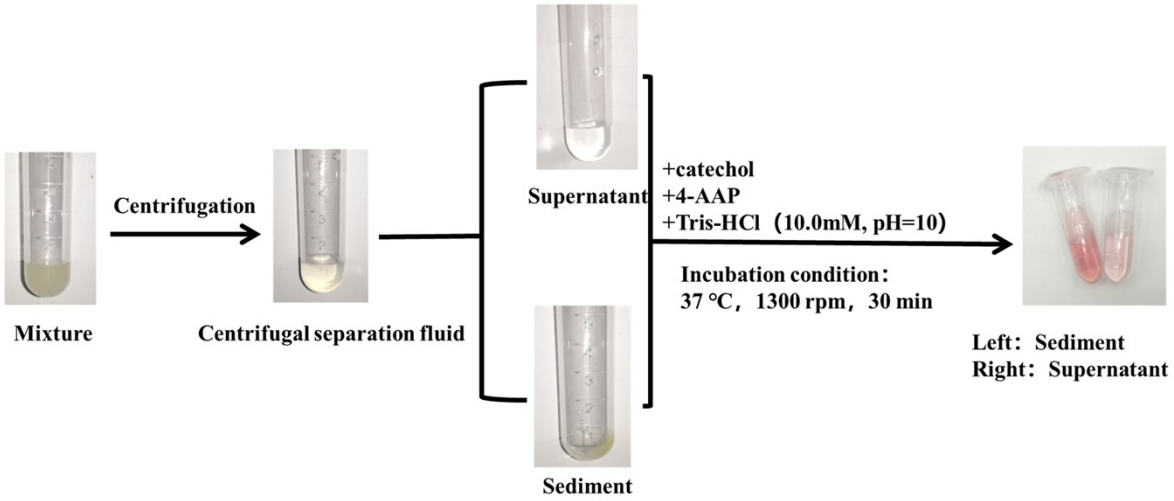

Fig. S4 The verification of the laccase activity of PAA-CeO_2.

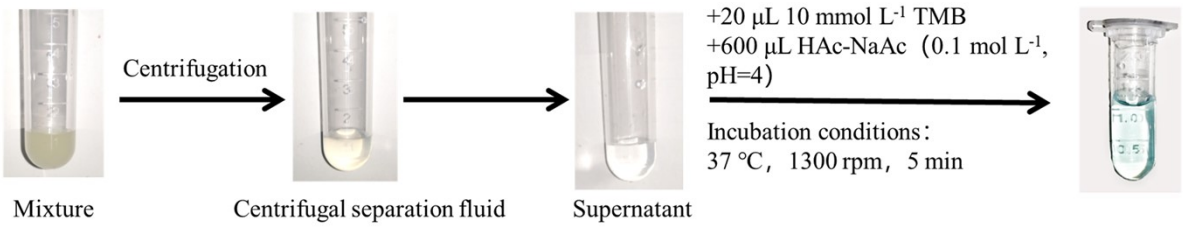

Fig. S5 The color reaction of the chromogenic substrate TMB

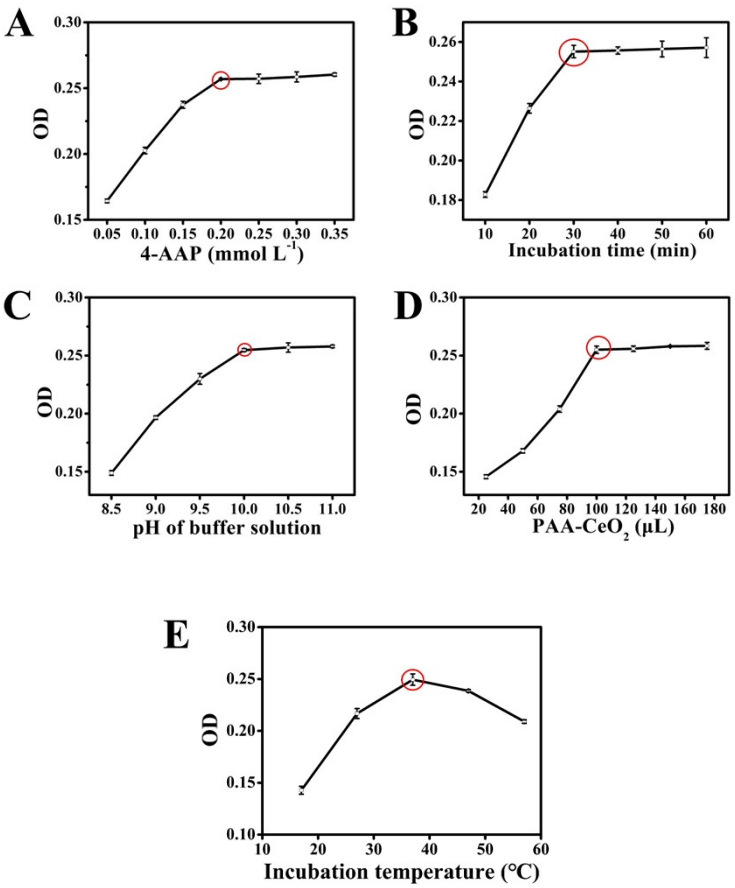

Fig. S6 The effect of different experimental parameters on the OD intensity of catechol detection: (A) the concentration of 4-AAP, (B) the incubation time of system, (C) the pH of buffer solution, (D) the volume of PAA-CeO_2 solution, (E) incubation temperature (the concentration of catechol was 50 μmol L^{-1} in all optimization experiments, error bar=SD, n=3)

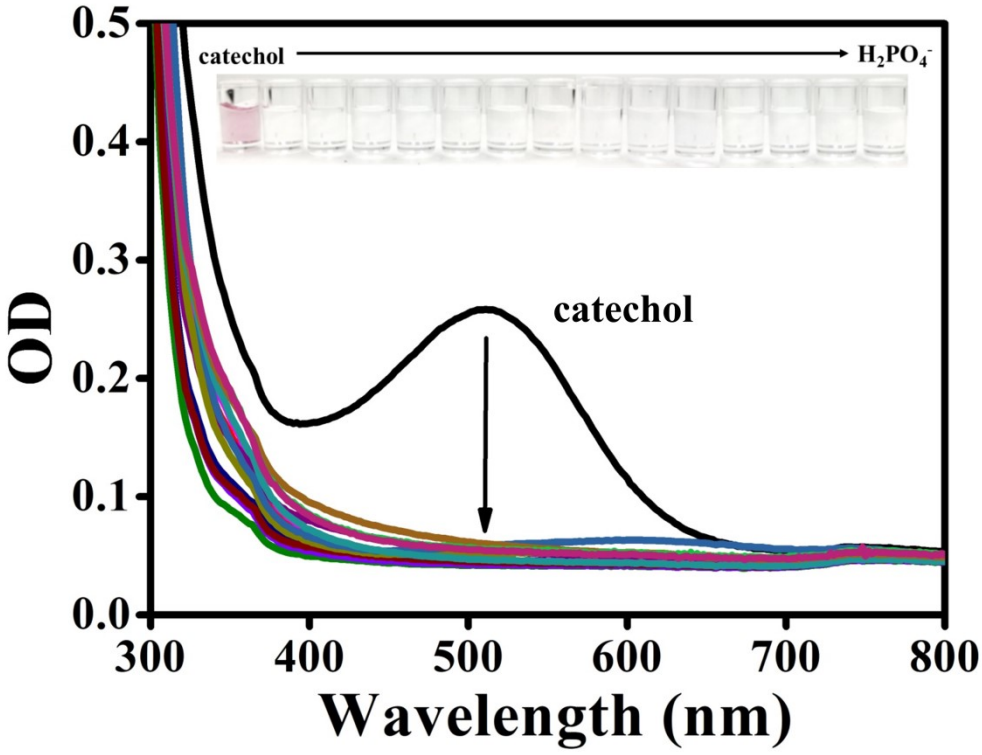

Fig. S7 The UV–Vis absorption spectra and photographic images (inset) of the target substance and other interfering ions added.

Table S1 Comparison with the previous methods for catechol detection

Determination Method	Materials	Linear range (μmol L^{-1})	LOD (μmol L^{-1})	Reference
Fluorescence sensor	Si nanoparticles	0.06-40	0.02	[1]
Fluorescence sensor	Fe-MIL-88NH_2	0.13-5	0.091	[2]
Electrochemical sensor	MoS_2 nanoflower	10^{-6}-1000	10^{-6}	[3]
Electrochemical sensor	Ti_3C_2/MOF	0.5-150	0.0031	[4]
Amperometric sensor	iridium (IV) oxide	0.05-10.65	0.017	[5]
Colorimetric detection	graphitic carbon nitride-copper hybrid nanoflowers	0-100	0.36	[6]
Colorimetric sensor	TMB- MnO_2	0.5-10	0.22	[7]
Colorimetric sensor	N,S-Co_3O_4	2-15	0.31	[8]
Colorimetric sensor	PAA-CeO_2	0.5-50	0.121	This work

Table S2 Recovery results of catechol in tap water by visual sensing platform（n=3）

sample	Added (μmol L^{-1})	Found ± SD (μmol L^{-1})	Recovery (%)
tap water	5	4.77 ± 0.001	95.40
	50	50.76 ± 0.002	101.52

References

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