Shaddock peel-loaded CeO_2 composites with peroxidase-like activity for dye degradation and trace detection of ascorbic acid

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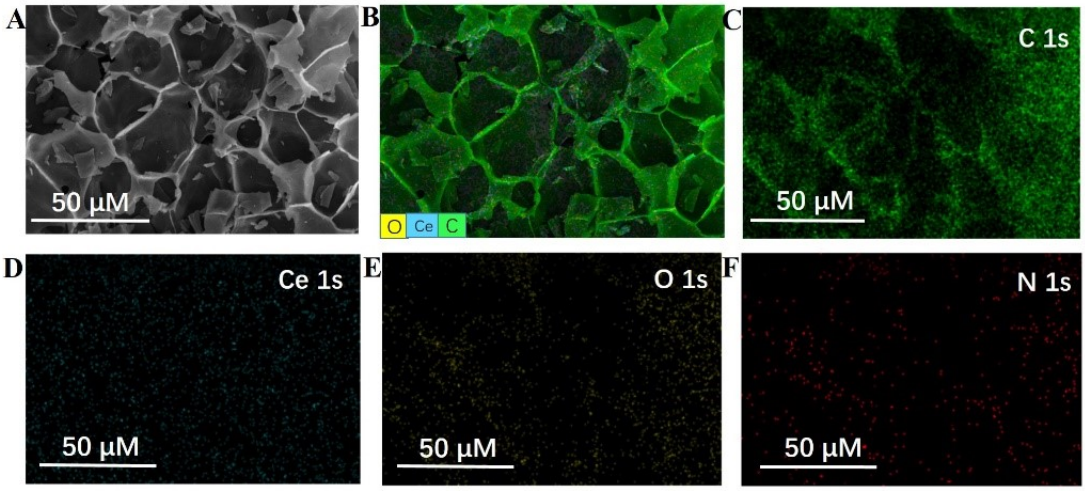

Figure S1 Elemental map distributions of C, Ce, O and N in Ce@CSP.

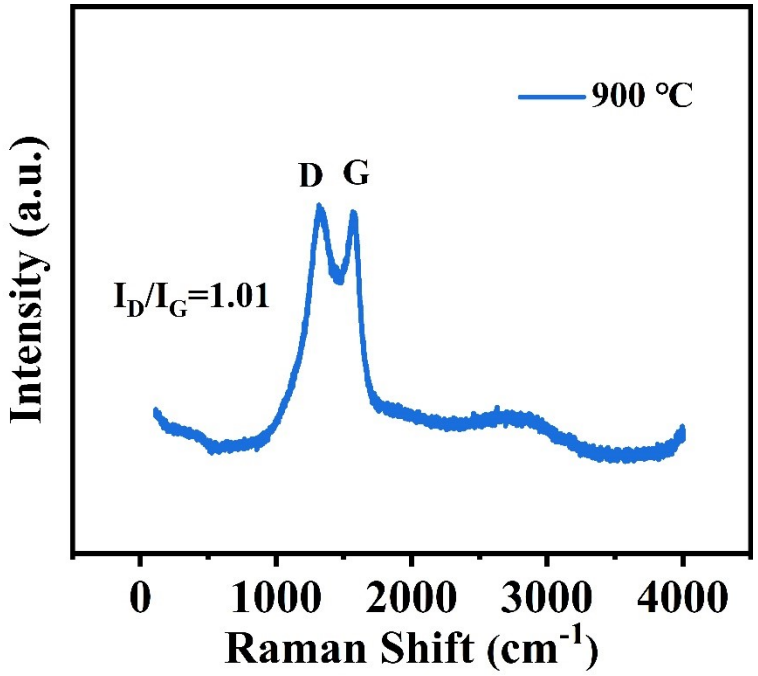

Figure S2 Raman spectra of CSP obtained by annealing at 900℃.

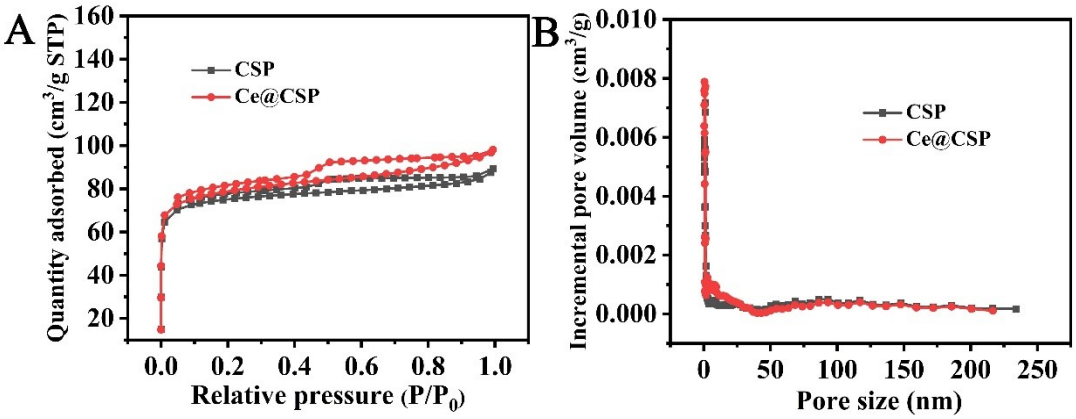

Figure S3 (A) N_2 adsorption–desorption isotherm of CSP and Ce@CSP. (B) Pore size distribution of CSP and Ce@CSP.

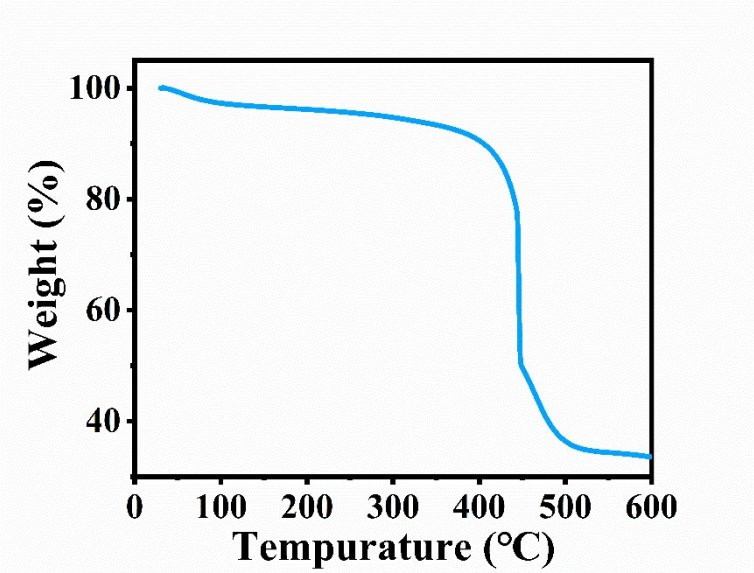

Figure S4 TGA curve of CeO_2 under O_2 condition.

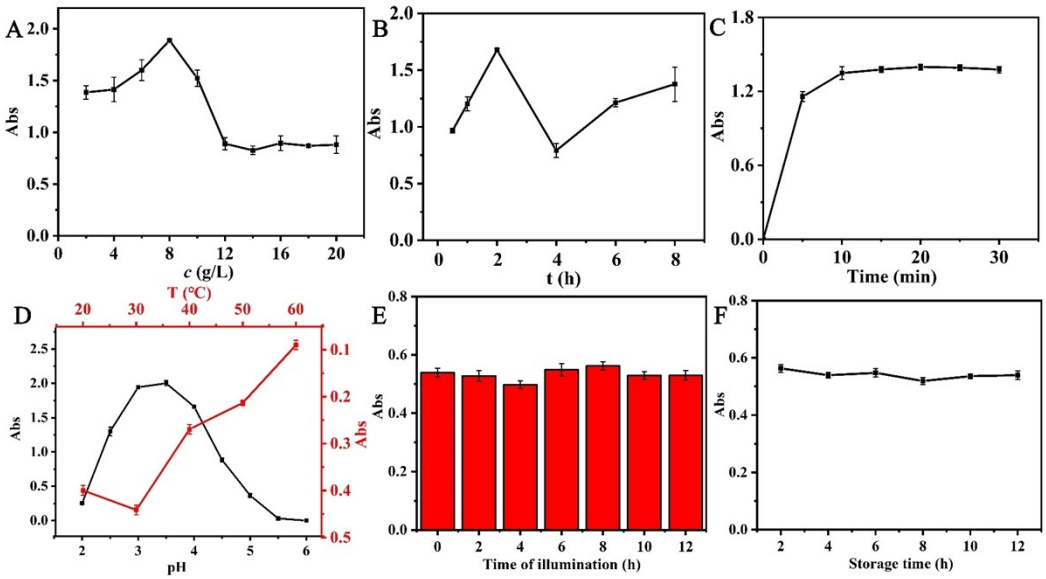

Figure S5 Effect of (A) concentration of $Ce(NH_4)_2(NO_3)_6$ soaked on the catalytic activity of Ce@CSP, (B) time of annealing on the catalytic activity of Ce@CSP, (C) reaction time on the catalytic activity of Ce@CSP, (D) temperature and pH on the catalytic activity of Ce@CSP, (E) illumination on the catalytic activity of Ce@CSP, (F) storage time on the catalytic activity of Ce@CSP.

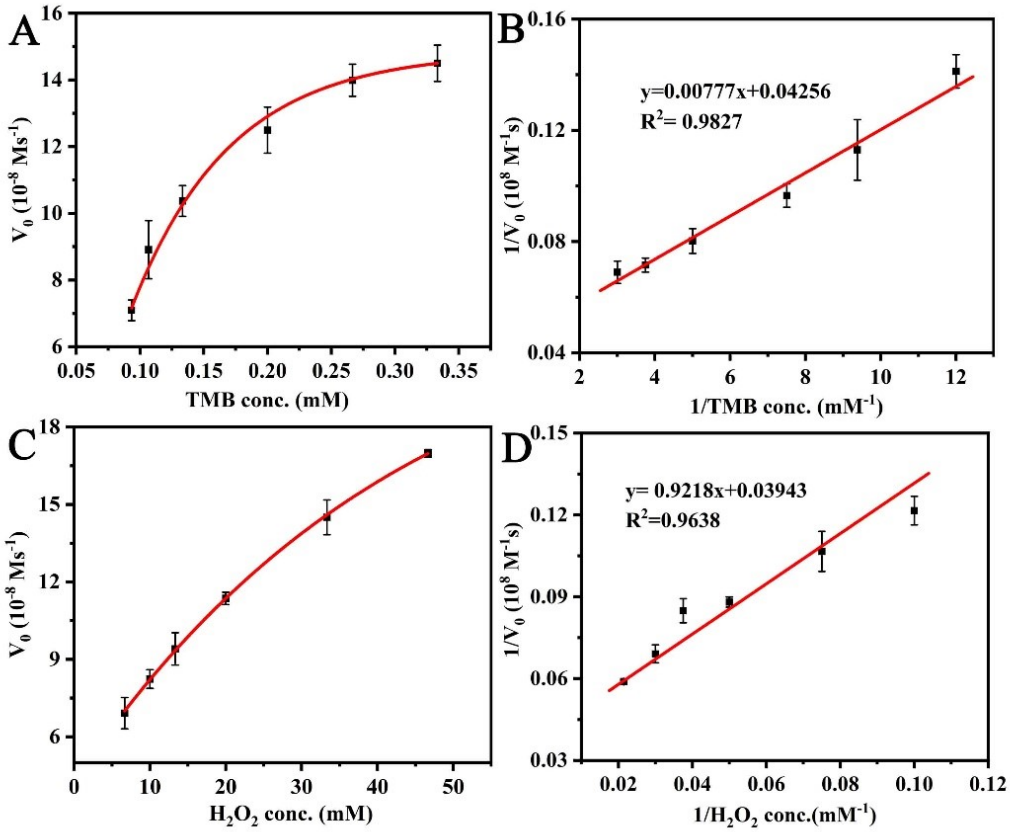

Figure S6 Kinetic analysis of prepared CSP nanocomposites by Michaelis-Menten model (A and B) and double reciprocal plots (C and D).

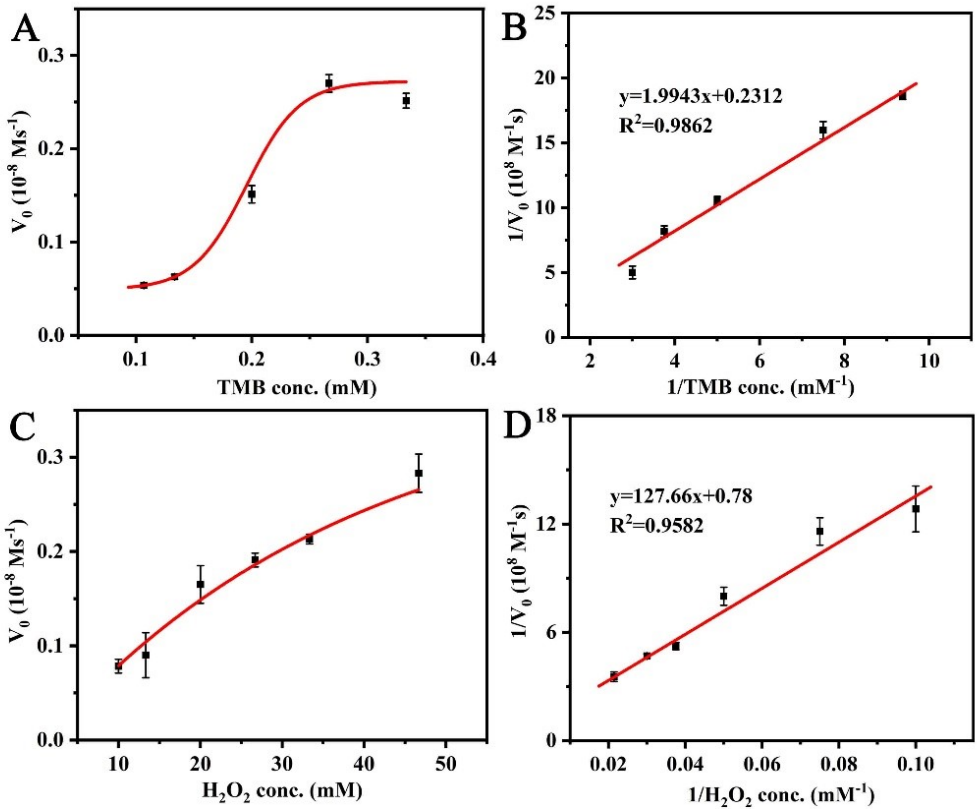

Figure S7 Kinetic analysis of prepared CeO_2 nanocomposites by Michaelis–Menten model (A and B) and double reciprocal plots (C and D).

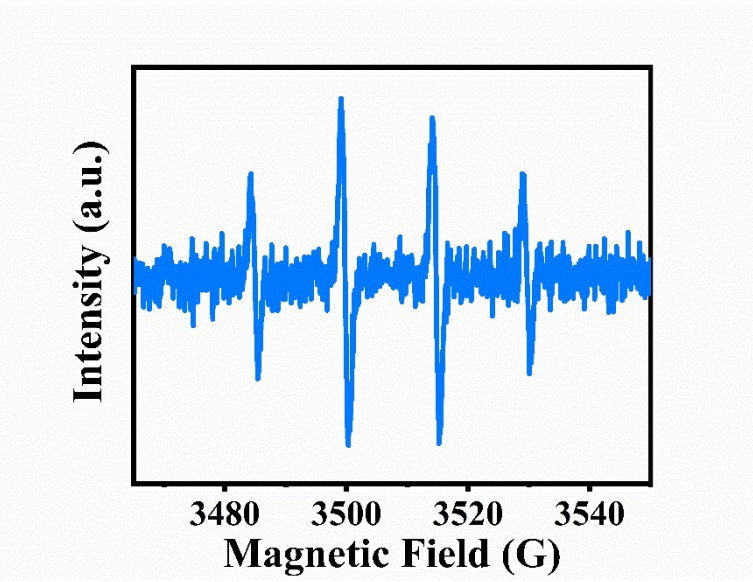

Figure S8 ESR spectra of DMPO/H_2O_2/Ce@CSP.

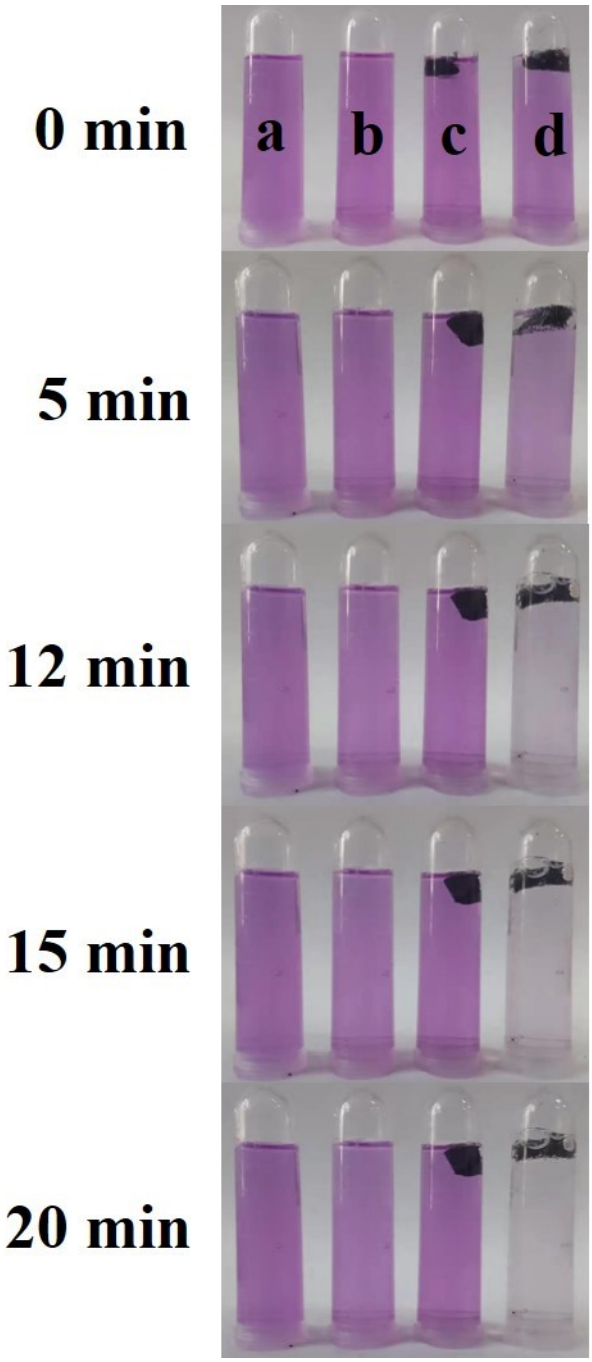

Figure S9 Decolorization of MV in real water samples. From left to right: (a)MV + H_2O; (b) MV + H_2O_2; (c) MV + H_2O + Ce@CSP and (d) MV + H_2O_2 +Ce@CSP. The reaction time was 0 min ,5 min,12 min ,15 min and 20 min at room temperature.

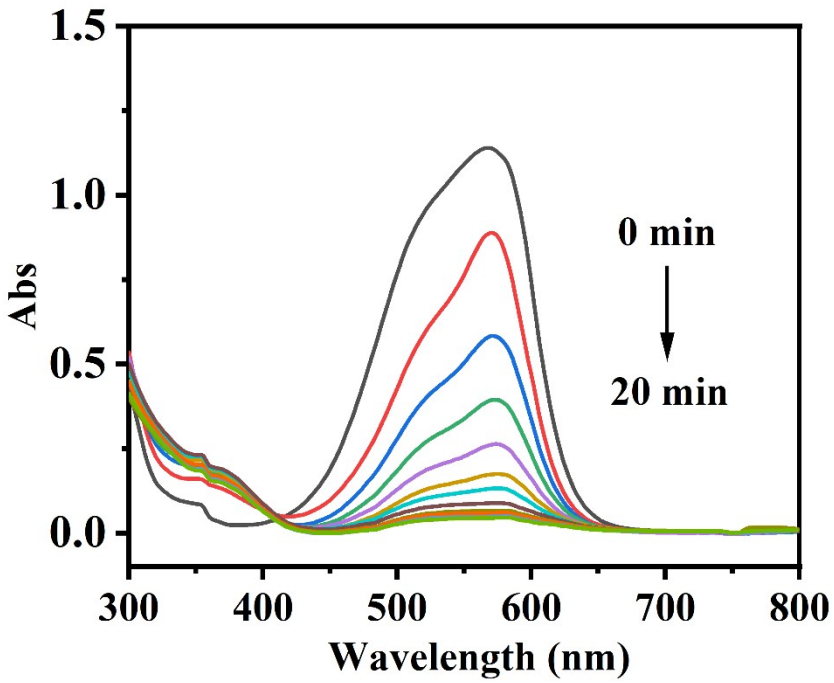

Figure S10 UV-Vis absorption spectra of degrading MV in the real water sample.

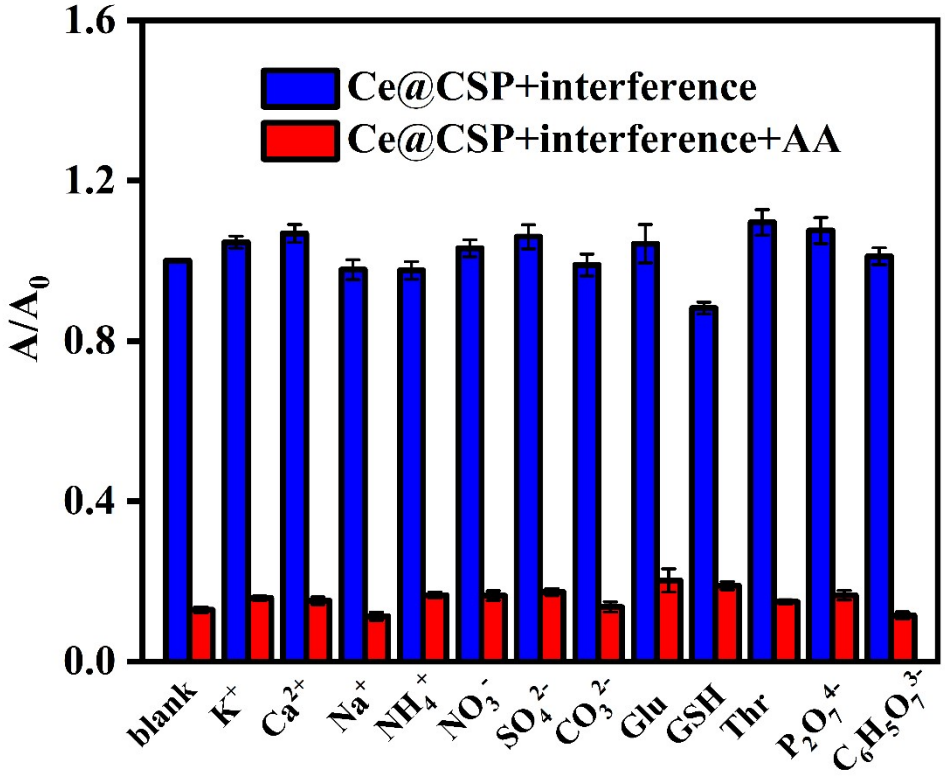

Figure S11 Influence by various interference (K^+, Ca^{2+}, Na^+, NH_4^+, NO_3^-, SO_4^{2-}, CO_3^{2-}, Glu, GSH, Thr, $P_2O_7^{4-}$, $C_6H_5O_7^{3-}$).

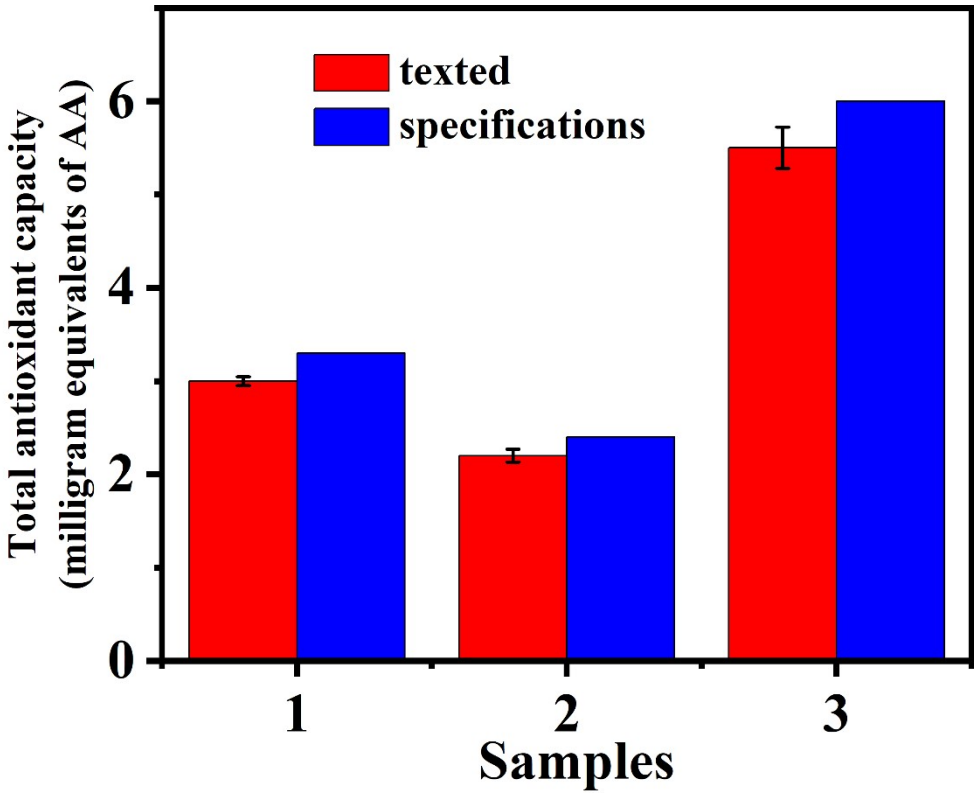

Figure S12 TAC of three commercial beverages (marked as 1-3) each error bar shows the standard deviation of three independent measurements.

Table S1 Surface area and pore volume of CSP and Ce@CSP.

Samples	Surface area (m^2/g)	Total pore volume (cm^3/g)
CSP	259.146	0.1305
Ce@CSP	272.9986	0.146

Table S2 Comparison of kinetic parameters of different CeO_2-based catalysts as peroxidase mimic.

Catalyst	K_m(mM)		V_m(10^{-8} M·s^{-1})		Ref.
	TMB	H_2O_2	TMB	H_2O_2	
CeO_2/C nanowire	0.12	2.61	2.08	3.31	[1]
Fe/CeO_2 nanorods	0.176	47.6	8.6	16.6	[2]
Mo/CeO_2 NPs	0.001	8.85	9.64	8.01	[3]
Co_3O_4-CeO_2	0.36	132.21	16.66	4.34	[4]
HRP	0.434	3.7	10	8.71	[5]
CSP	0.183	23.38	23.50	25.36	This work
CeO_2	8.63	163.67	4.33	1.28	This work
Ce@CSP	0.059	8.32	19.69	17.89	This work

Table S3 Comparison of different systems of detecting AA using colorimetric method.

Materiral	Method	LOD(μM)	Linear range(μM)	Ref
Cu-Ag/rGO	Colorimetric	3.6	5-30	[6]
Cu NPs@C	Colorimetric	1.4	10-1000	[7]
SA-AuNPs	Colorimetric	11.2	12.5-150.0	[8]
AuNPs	Colorimetric	2.44	5-60	[9]
Ce@CSP	Colorimetric	1.07	1.6-17.3	this work

Reference

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