Chrysanthemum-like Fe-Co LDH with peroxidase mimicking activity for visual and photothermal determination of H_2O_2 and glucose

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Materials and reagents

Ferric(Ⅲ) chloride hexahydrate ($FeCl_3·6H_2O$), Cobalt(II) nitrate hexahydrate ($Co(NO_3)_3·6H_2O$), urea ($CO(NH_2)_2$), ammonium fluoride (NH_4F) 3,3',5,5'-tetramethylbenzidine (TMB), sodium hydroxide (NaOH), ethanol (C_2H_5OH), hydrogen peroxide (30 wt%) (H_2O_2), acetic acid (CH_3COOH), sodium acetate (CH_3COONa), horseradish peroxidase (HRP), glucose oxidase (GOx), fructose, sucrose, lactose, ascorbic acid (AA), glutathione (GSH) sucrose were purchased from Aladdin Bio-Chem Technology Co. Ltd (Shanghai, China). Ultrapure water was used in all the experiments. All chemicals were of analytical standard, used as received.

Instruments and equipment

All the temperature was detected by a digital multimeter (Shengli Technology, China). The surface morphology of the sample was obtained from scanning electron microscopy (SEM, Tescan Mira4, USA). UV-vis spectra were obtained on a Infinite

200 PRO microplate reader (Tecan, Switzerland). X-ray diffraction (XRD) patterns were obtained by using D8 focus diffractometer (Bruker AXS, Germany). X-ray photoelectron spectra (XPS) were elucidated using an ESCALAB 250 electron energy spectrometer (Thermo Fisher Scientific K-Alpha, USA). Infrared spectra spectrometer (FTIR) was scanned using a Nicolet iS50 FTIR spectrometer (Thermo Fisher Scientific, USA); X-ray photoelectron spectroscopy (XPS) was performed using an Escalab 250Xi instrument (Thermo Fisher Scientific, USA), the ultraviolet spectrophotomete (UV-vis) performed using Infinite 200 PRO microplate reader (Tecan, Switzerland)

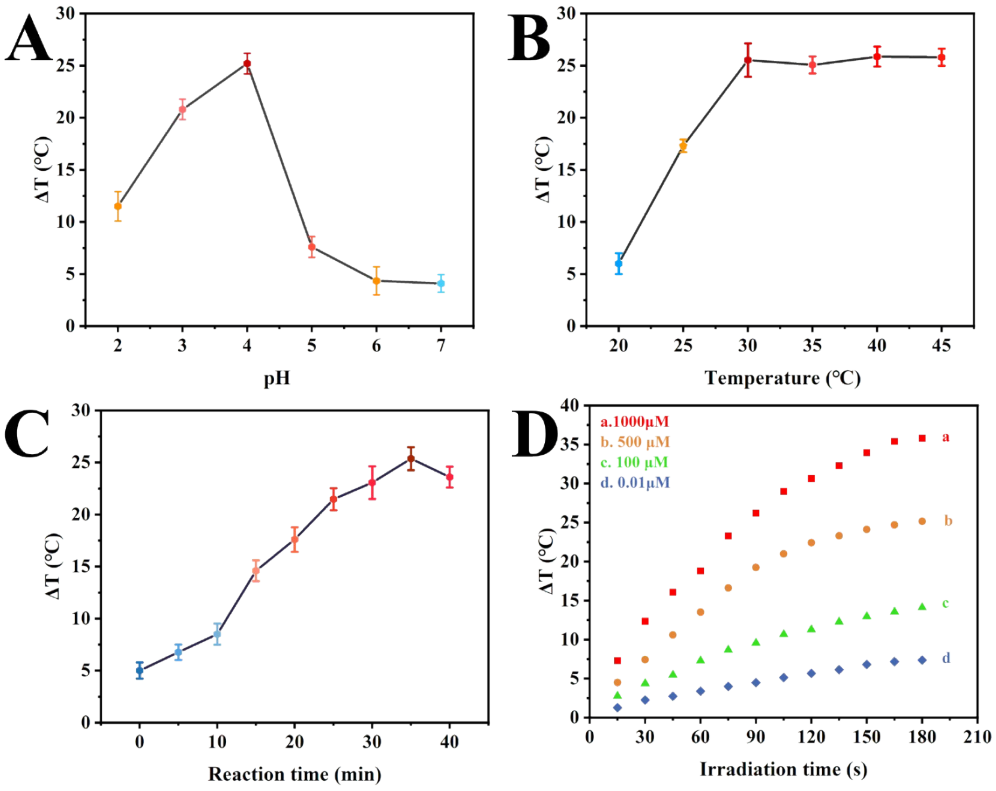

Fig. S1 Optimization of conditions for H_2O_2 detection. Effects of(A) buffer pH (A), (B) temperature, (C) reaction time, and (D) irradiation time on the detection of H_2O_2.

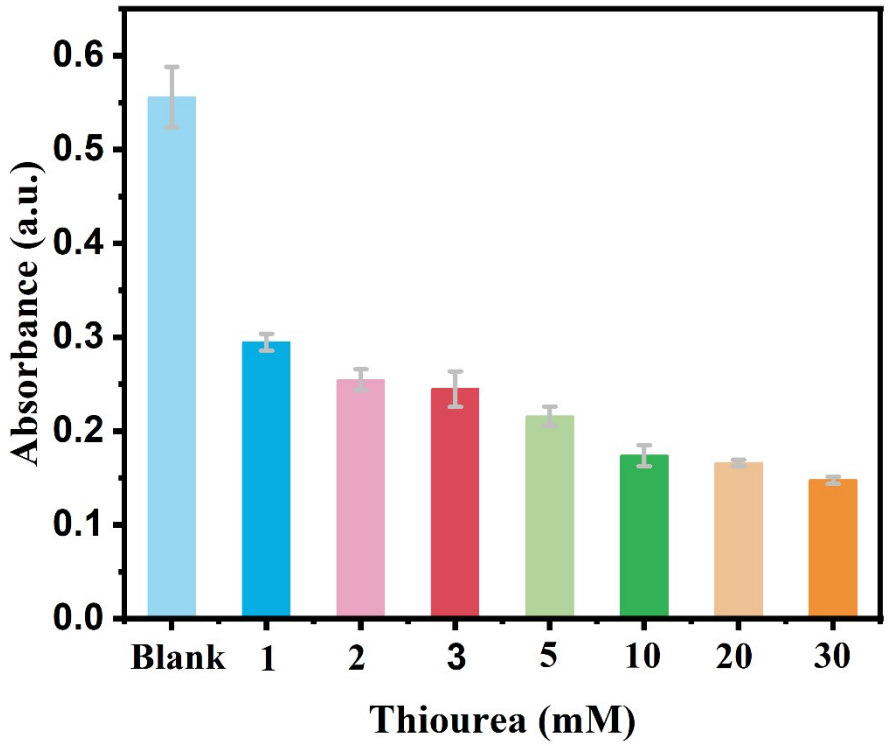

Fig. S2 Absorbance at 652 nm of TMB-H_2O_2 solution catalyzed by Fe-Co LDH in presence of different concentrations scavengers thiourea.

Table S1 Comparison of determination methods for H_2O_2.

Materials	Methods	Linear rang (μM)	LOD(μM)	Reference
MOF-808	colorimetry	10-1000	4.5	[1]
Co_3O_4	colorimetric	100-5000	4.08	[2]
$CuFe_2O_4$	colorimetric	200-500	50.9	[3]
Fe-N-C SANs	colorimetric	10-600	4.36	[4]
$Fe_{1.5}$-N-GDY	colorimetric	100-2000	52.96	[5]
Fe-Co LDH	photothermal	10-1000	2.56	This work

Table S2 Comparison of determination methods for glucose

Materials	Methods	Linear rang (μM)	LOD(μM)	Reference
GelRed/$[G_3T]_5/Tb^{3+}$	Fluorescence	10-100	3.8	[6]

Fe_3O_4@MSN	colorimetric	10-500	40	[7]
Bi-BDC-NH_2@Au	photothermal	10-12000	5.7	[8]
Cu_9-Zn_1-MOF	colorimetric	10-300	7.1	[9]
CuO/SnS_2	Electrochemistry	0-20000	9.7	[10]
Fe-Co LDH	photothermal	10-1000	2.51	This work

Table S3 Comparison of the peroxidase-like activity and sensing performance of various nanozyme systems for glucose detection

Nanozyme Type	Nanozyme Composition	Linear rang (μM)	LOD(μM)	Reference
Fe-Based	Fe_3O_4@MSN	10-500	40	[7]
Co-Based	Co-MOF@Hemin	300-3000	49	[11]
Fe-Co-Based	CuZnFeS	16-60	4.1	[12]
LDH-Based	carbon fiber @CuAl-LDH	5-100	3.8	[13]
LDH-Based	CuNiAl LDH	10-200	2.9	[14]
Fe-LDH-Based	NiFe-LDH	50-2000	23	[15]
Co-LDH-Based	Co–Al ELDH	50-500	50	[16]
Fe-Co LDH	photothermal	10-1000	2.51	This work

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