Supporting Information

Fenton-like reaction system with an analyte-activated catfish effect for enhanced colorimetric and photothermal dopamine bioassay

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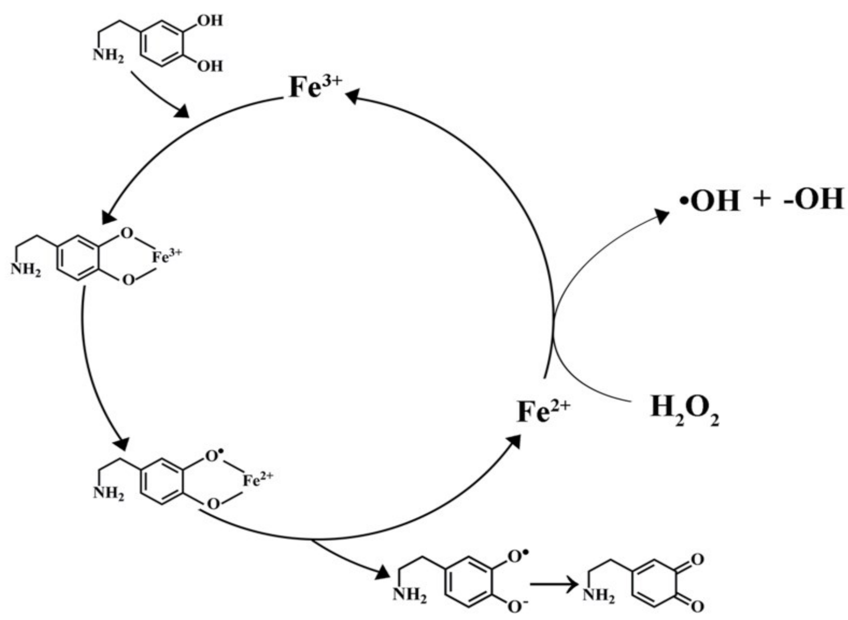

Fig.S1 The pathway for the proposed dopamine-activated Fenton-like sensing system.

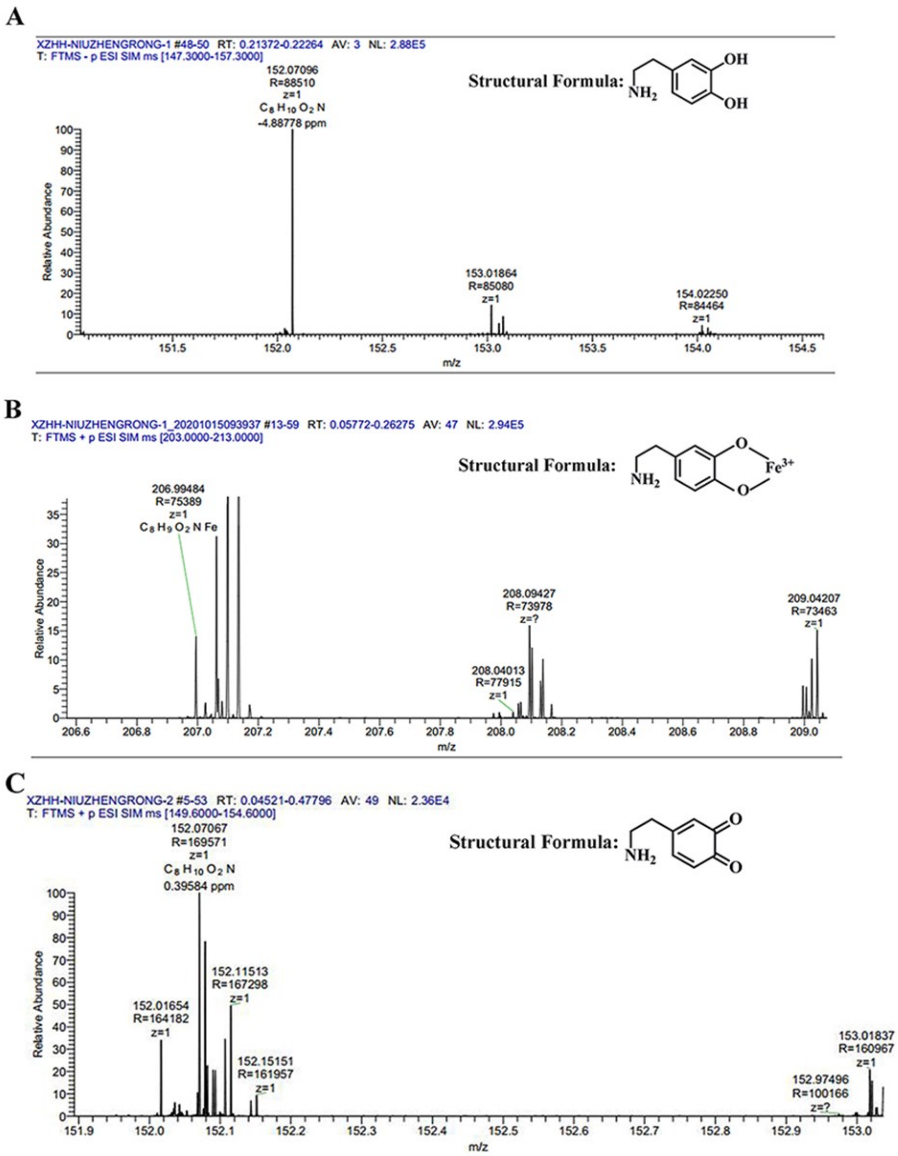

Fig.S2 The Mass spectrum (MS) of the DA-Fe^3 -H_2O_2 system.

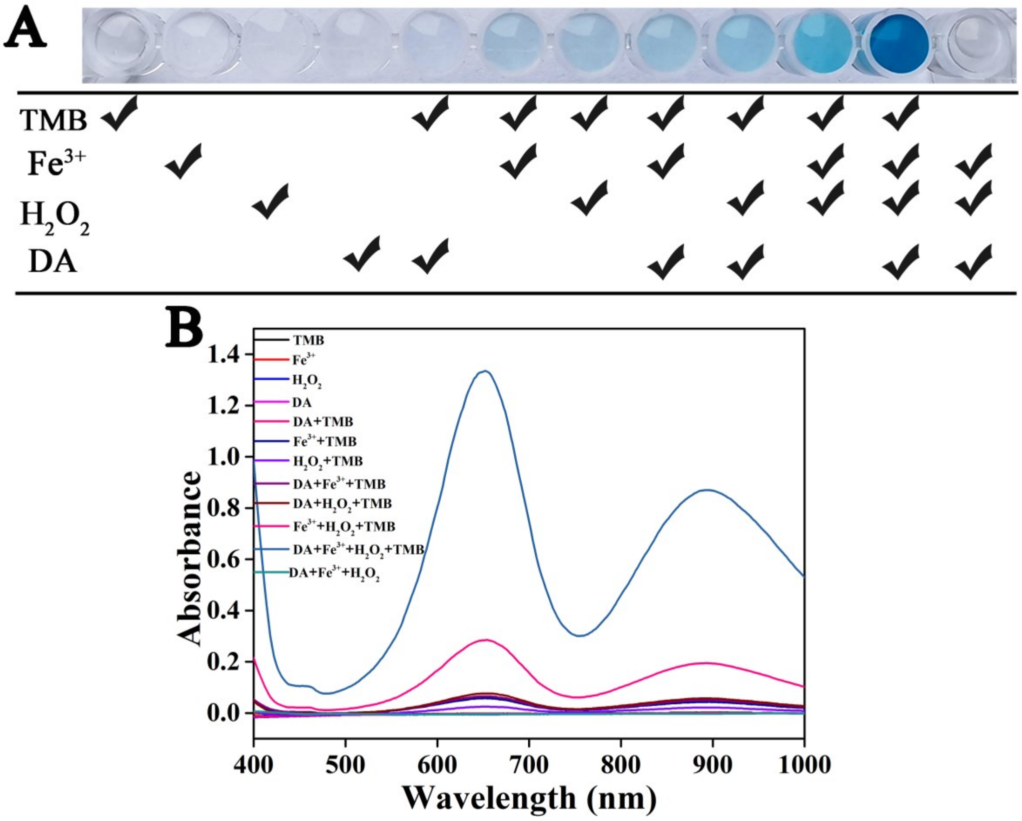

Fig. S3. Photographs (A) and Vis-NIR absorption spectra (B) of Fenton-like reaction system with different components. The final concentrations of dopamine (DA), Fe^{3+}, TMB, and H_2O_2 in the reaction solutions are 4 μM, 0.024 mM , 0.3 mM, and 0.833 mM, respectively. Error bars indicate standard deviations (n = 3).

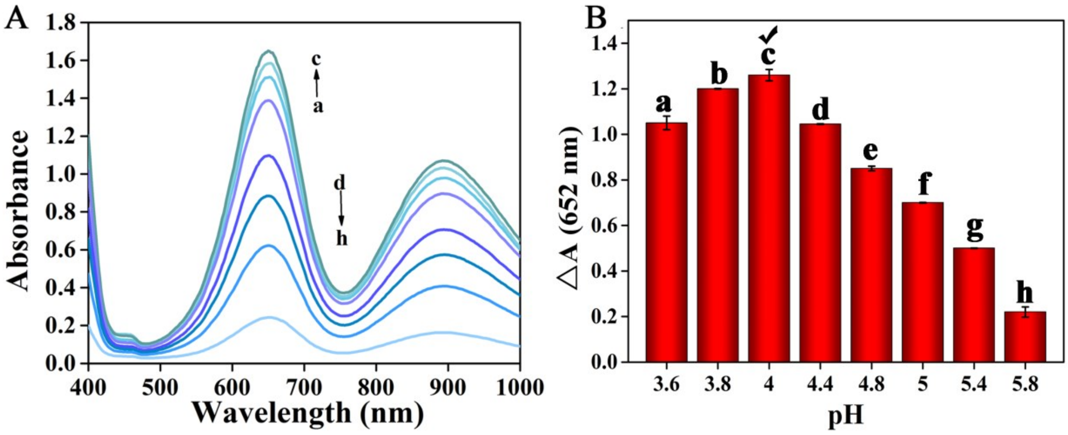

Fig. S4. Effect of pH on the TMB oxidation in Fenton-like reaction system. (A) Vis-NIR absorption spectra under different pH and (B) the histogram of corresponding absorbance at 652 nm vs pH (a-h: 3.6, 3.8, 4, 4.4, 4.8, 5, 5.4 and 5.8).

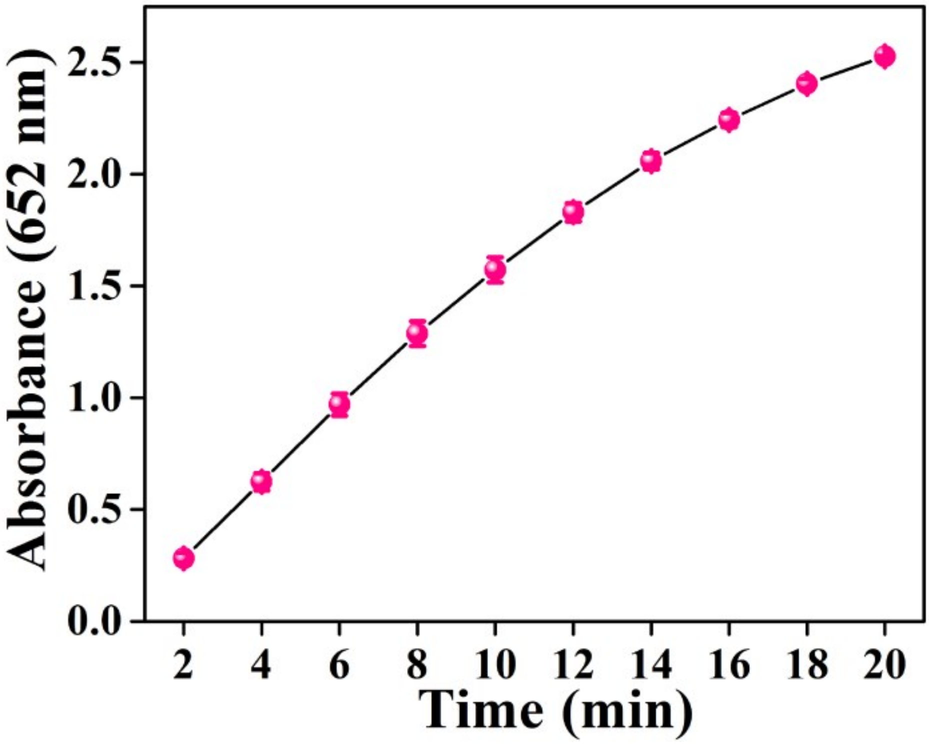

Fig. S5. Time-evolution in the absorbance of TMB oxidation at 652 nm in Fenton-like reaction system in the presence of dopamine (4 μM) at pH 4.0.

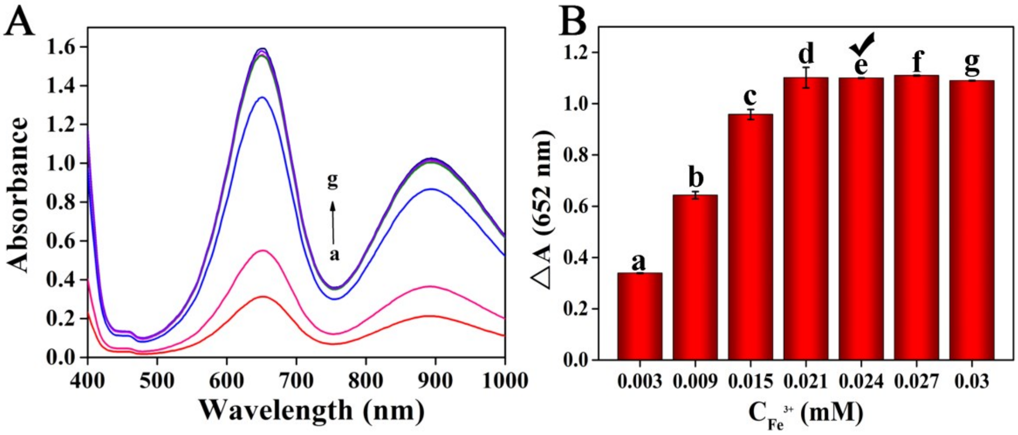

Fig. S6. Effect of Fe^{3+} concentration on the TMB oxidation in Fenton-like reaction system. (A) Vis-NIR absorption spectra and (B) absorbance changes of TMB oxidation product at 652 nm in the presence and absence of dopamine (4 μM) under different Fe^{3+} concentrations (a-g: 0.003, 0.009, 0.015, 0.021, 0.024, 0.027 and 0.03 mM Fe^{3+}).

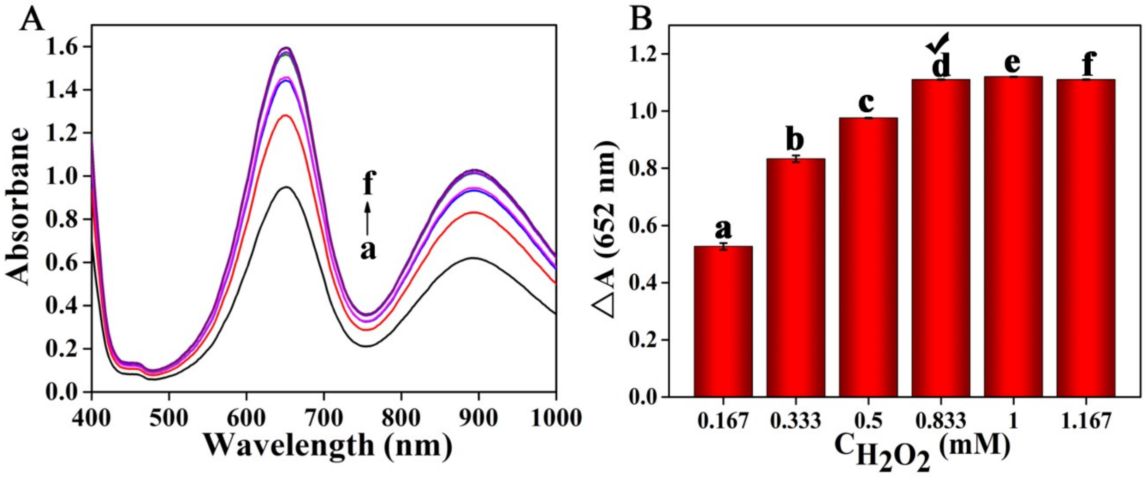

Fig. S7. Effect of H_2O_2 concentration on the TMB oxidation in Fenton-like reaction system. (A) Vis-NIR absorption spectra and (B) absorbance changes of TMB oxidation product at 652 nm in the presence and absence of dopamine (4 μM) under different H_2O_2 concentrations (a-f: 0.167, 0.333, 0.5, 0.833, 1 and 1.167 mM H_2O_2).

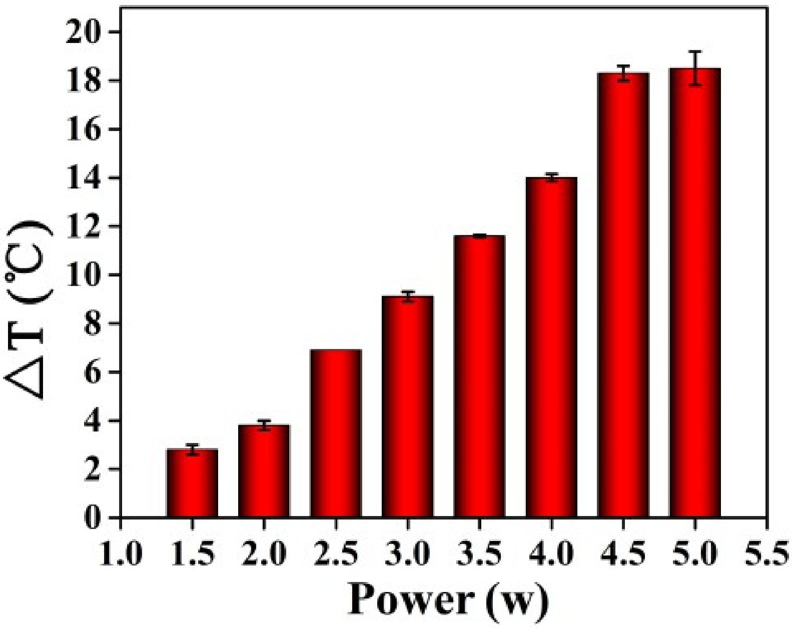

Fig. S8. Temperature increment (△T) of the proposed Fenton-like reaction system at different irradiation power (irradiation time: 120 s).

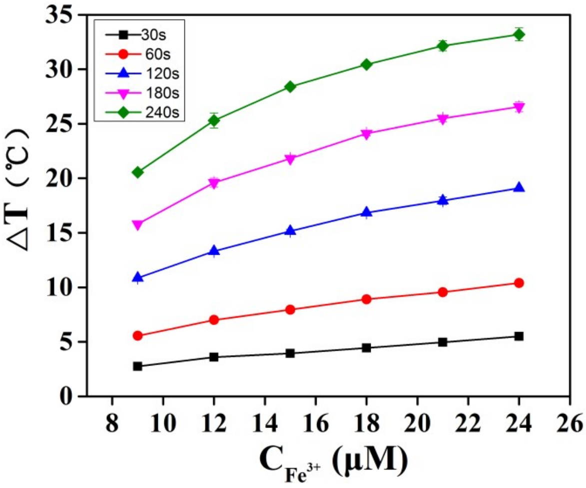

Fig. S9. Linear relationships between Fe^{3+} concentration and temperature increment (△T) in the proposed Fenton-like reaction system at irradiation power of 4.5 W within the different irradiation times ranging from 30 to 240 s.

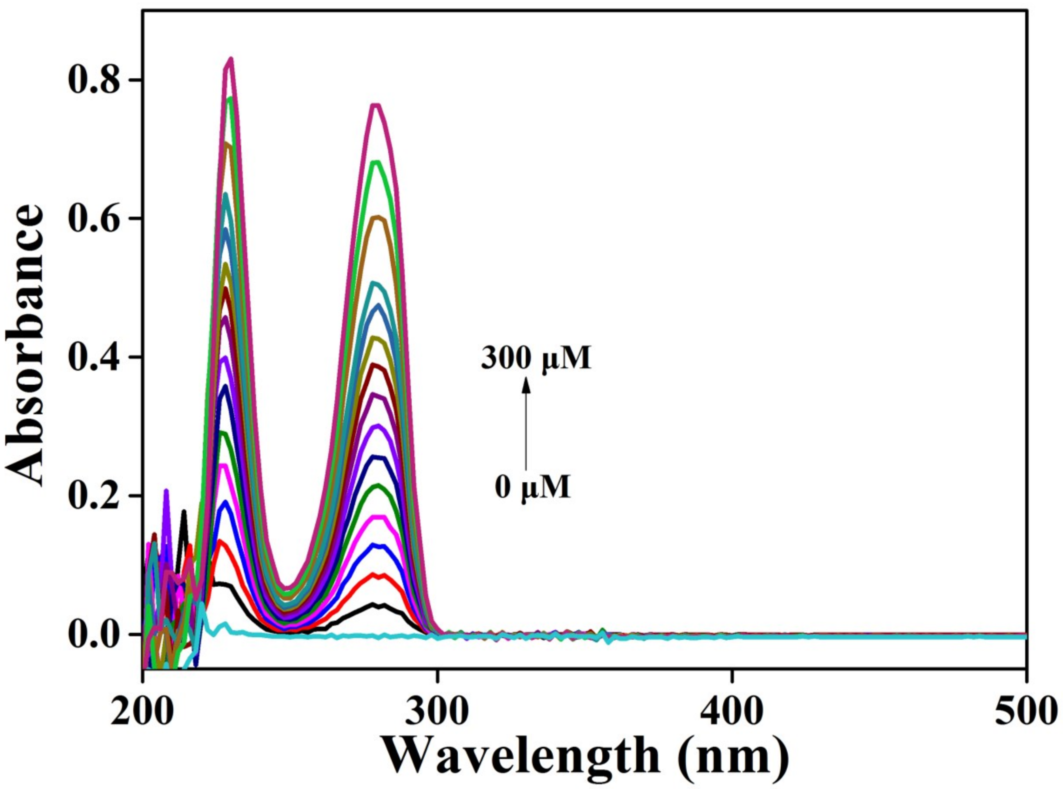

Fig.S10 UV-vis absorption spectrum of the DA-promoted Fenton-like reaction system in the presence of DA with the different concentrations ranging from 0 to 300 μM.

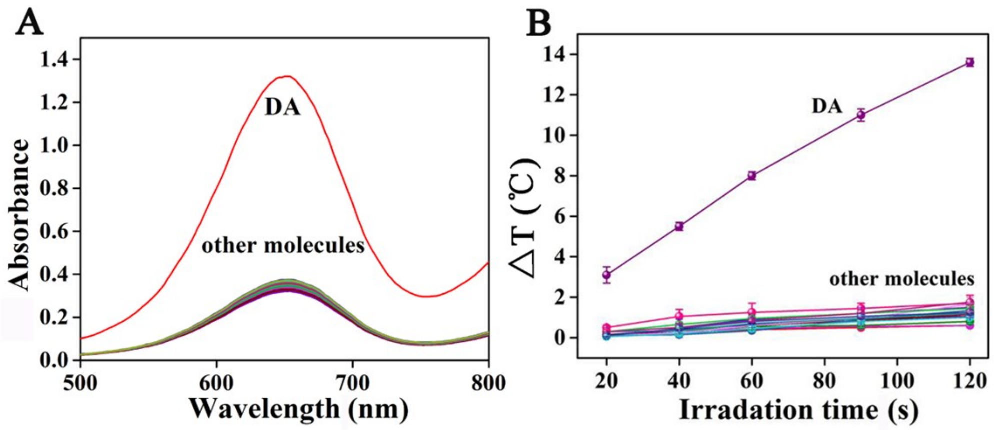

Fig. S11 (A) Vis absorption spectrum of the proposed reaction system in the presence of DA and other common interferences and (B) the corresponding temperature changes of the proposed reaction system in the presence of DA and other common interferences within irradiation times ranging from 20 to 120 s. The final concentrations of DA, AA, UA, and GSH were 4 μM and other interfering compounds were 40 μM.

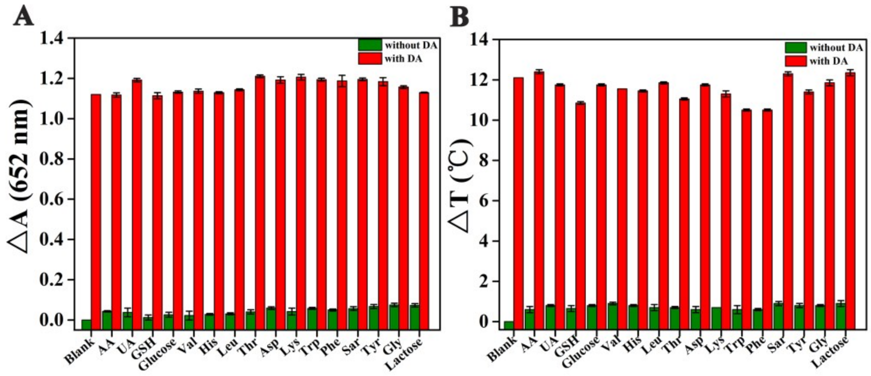

Fig. S12. The △A (652 nm) and △T (℃) of the proposed Fenton-like reaction system in the presence of dopamine and AA, UA, GSH, Glucose, Val, His, Leu, Thr, Asp, Lys, Trp, Phe, Sar, Tyr, Gly and Lactose (4 μM for DA, AA, UA, and GSH, 40 μM for other interfering compounds. Green bar: TMB+interfering compounds; Red bar: TMB+interfering compounds+DA.

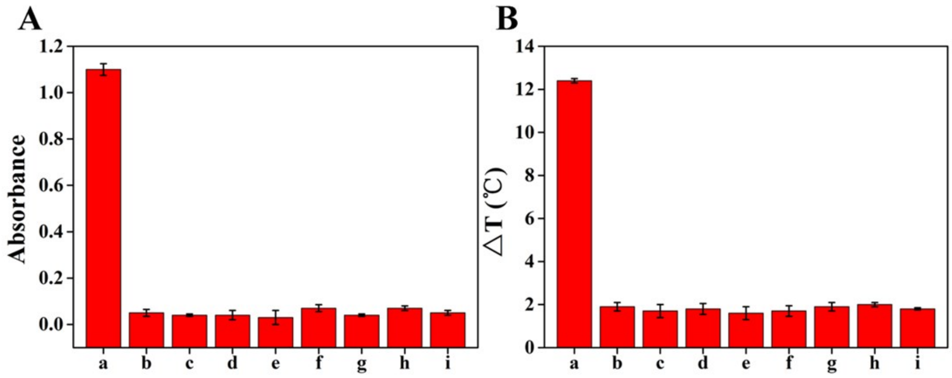

Fig.S13 (A) Histogram of the absorbance value of the proposed reaction system in the presence of DA and other common interferences contained two phenolic hydroxyl group. (B) Histogram of the temperature change of the proposed reaction system in the presence of DA and other common interferences contained two phenolic hydroxyl group (a-i: DA, hydroquinone, catechol, resorcinol, chlorphenol red, BPA, pyrocatechol violet, xylenol orange and blank**,** 4 μM for DA, 40 μM for other interfering compounds).

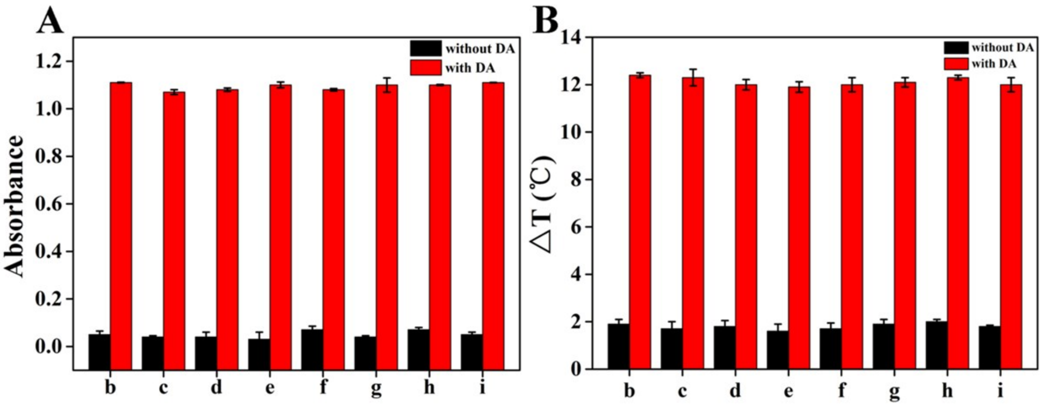

Fig.S14 The absorbance value and △T (℃) of the proposed Fenton-like reaction system in the presence of dopamine, hydroquinone, catechol, resorcinol, chlorphenol red, BPA, pyrocatechol violet, xylenol orange and blank**,** (4 μM for DA, 40 μM for other interfering compounds. Blank bar: TMB+interfering compounds; Red bar: TMB+interfering compounds+DA.

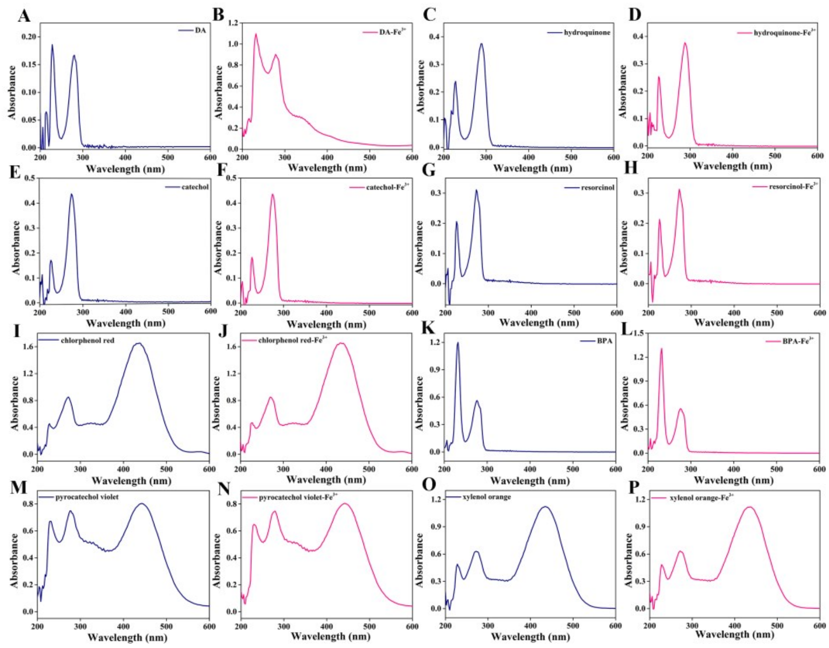

Fig. S15 The UV-Vis spectra of (A) DA; (B) DA-Fe^{3+}; (C) hydroquinone; (D) hydroquinone-Fe^{3+}; (E) catechol; (F) catechol-Fe^{3+}; (G) resorcinol; (H) resorcinol-Fe^{3+}; (I) chlorphenol red; (J) chlorphenol red-Fe^{3+}; (k) BPA; (L) BPA-Fe^{3+}; (M) pyrocatechol violet; (N) pyrocatechol violet-Fe^{3+}; (O) xylenol orange; (P) xylenol orange-Fe^{3+}.

Table S1. Comparison of different sensors for dopamine detection

Sensing system	Method	Reader	Detection range (μmol/L)	Detection limit (nmol/L)	Ref.
BSA-AuNCs	Colorimetry and fluorometry, "light off"	Ultraviolet spectrophotometer Fluorospectro photometer	0.01-1	10	[1]
ZnO QDs	Fluorometry	Fluorospectro photometer	0.05-10	12	[2]
BSA-AuNCs/Cu^{2+}	Fluorometry	Fluorospectro photometer	0–3.5	100	[3]
FITC/GOs	Fluorometry	Fluorospectro photometer	0.2 -2	200	[4]
AuNRs/Ag^{+}	Colorimetry	Ultraviolet spectrophotometer	0.2–12	47	[5]
Dopamine-promoted	Colorimetry	Ultraviolet spectrophotometer	0.1-4	47	This work
fenton-like reaction	Photothermal	Thermometer	0.1-4	91	

References

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