Supplementary Information

Balancing "on" and "off" response of hydroxy groups to nanozyme catalyzing system to construct ultrasensitive and selective "signal-on" detection platform for dopamine

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Table of Contents:

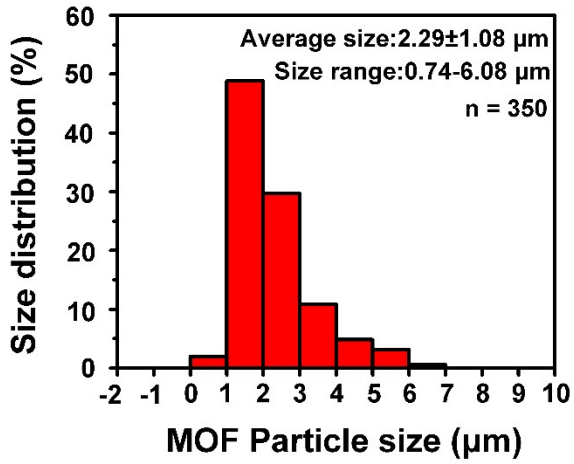

Fig. S1 The size distribution of MIL-101(Fe) calculated from Fig. 1A.

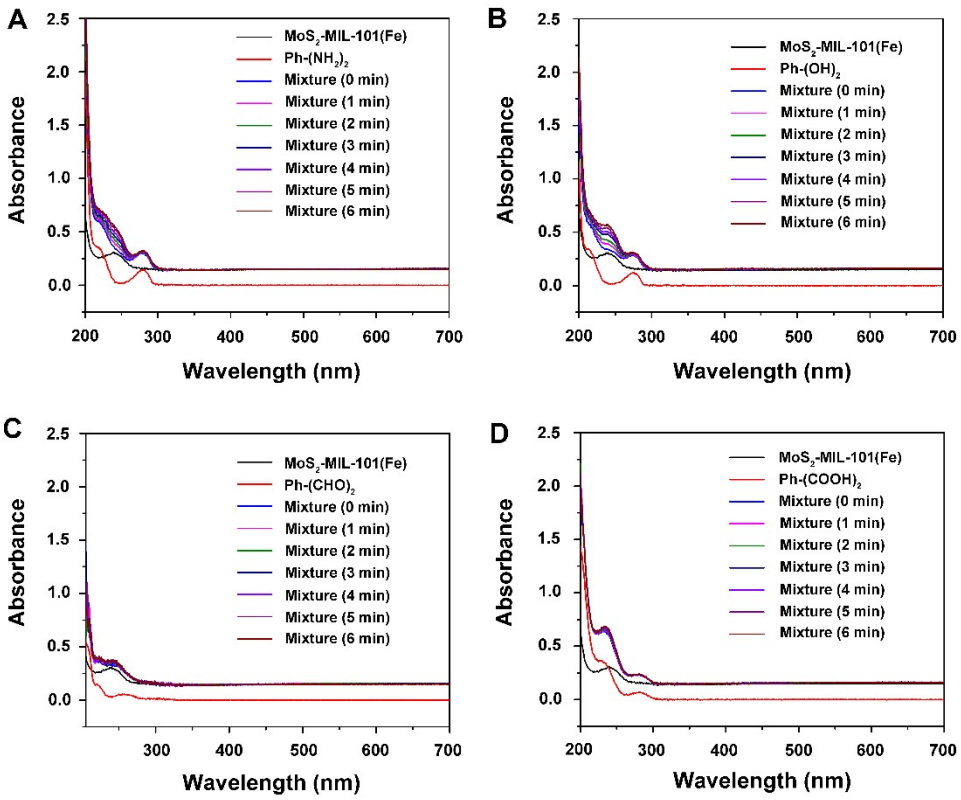

Fig. S2 (A) UV-Vis spectra of MoS_2-MIL-101(Fe), Ph-$(NH_2)_2$, and the mixture of MoS_2-MIL-101(Fe) and Ph-$(NH_2)_2$ after mixing for 0, 1, 2, 3, 4, 5, 6 min; (B) UV-Vis spectra of MoS_2-MIL-101(Fe), Ph-$(OH)_2$, and the mixture of MoS_2-MIL-101(Fe) and Ph-$(OH)_2$ after mixing for 0, 1, 2, 3, 4, 5, 6 min; (C) UV-Vis spectra of MoS_2-MIL-101(Fe), Ph-$(CHO)_2$, and the mixture of MoS_2-MIL-101(Fe) and Ph-$(CHO)_2$ after mixing for 0, 1, 2, 3, 4, 5, 6 min; (D) UV-Vis spectra of MoS_2-MIL-101(Fe), Ph-$(COOH)_2$, and the mixture of MoS_2-MIL-101(Fe) and Ph-$(COOH)_2$ after mixing for 0, 1, 2, 3, 4, 5, 6 min. Condition: 50 mg L^{-1} of MoS_2-MIL-101(Fe), 50 μM of Ph-$(NH_2)_2$, Ph-$(OH)_2$, Ph-$(CHO)_2$, and Ph-$(COOH)_2$.

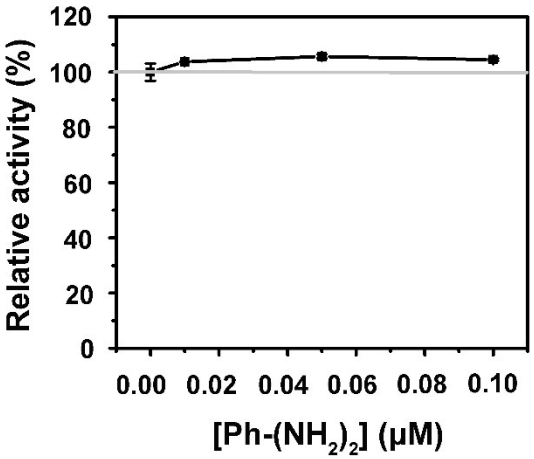

Fig. S3 The response of MoS_2-MIL-101(Fe) catalzyed H_2O_2-TMB system to Ph-$(NH_2)_2$ in the concentration of 0, 0.01, 0.05, 0.10 μM.

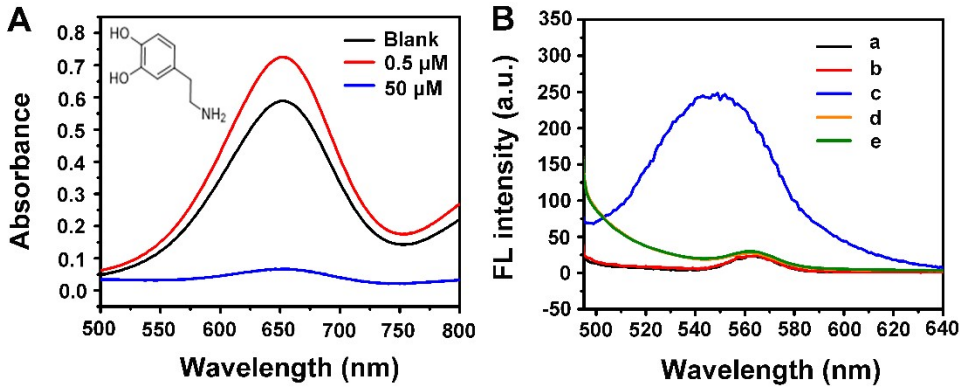

Fig. S4 (A) UV-Vis spectra of MoS_2-MIL-101(Fe) catalzyed H_2O_2-TMB system in the presence or absence of DA with 0.5 μM and 50 μM. (B) The fluorescence spectra of different systems (a. MoS_2-MIL-101(Fe)+H_2O_2; b. MoS_2-MIL-101(Fe)+H_2O_2+DA (0.5 μM); c. MoS_2-MIL-101(Fe)+H_2O_2+DA (50 μM); d. MoS_2-MIL-101(Fe)+H_2O_2+DA (0.5 μM)+TMB; e. MoS_2-MIL-101(Fe)+H_2O_2+DA (50 μM)+TMB. Buffer: 0.2 M NaAc-HAc solution (pH 4.0); H_2O_2 concentration: 0.06 mM; TMB concentration: 0.1 mM; MoS_2-MIL-101(Fe) concentration: 5 mg/L; Reaction time: 15 min; Excitation wavelength 475 nm.

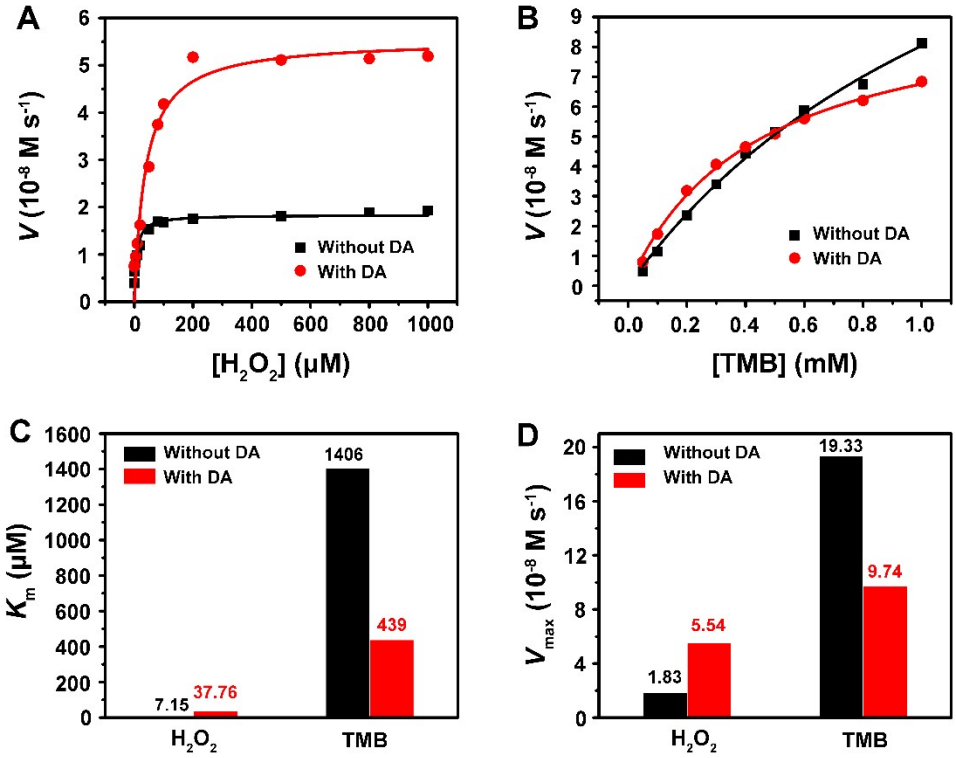

Fig. S5 (A) The kinetic curve of MoS_2-MIL-101(Fe)+H_2O_2+TMB system in the presence or absence of 0.5 μM DA with the change of H_2O_2 concentration and a fixed TMB concentration of 0.10 mM; (B) The kinetic curve of MoS_2-MIL-101(Fe)+H_2O_2+TMB system in the presence or absence of 0.5 μM DA with the change of TMB concentration and a fixed H_2O_2 concentration of 0.06 mM; (C) The Michaelis constant K_m and (D) the maximum reaction velocity V_{max} obtained from the kinetic curves.

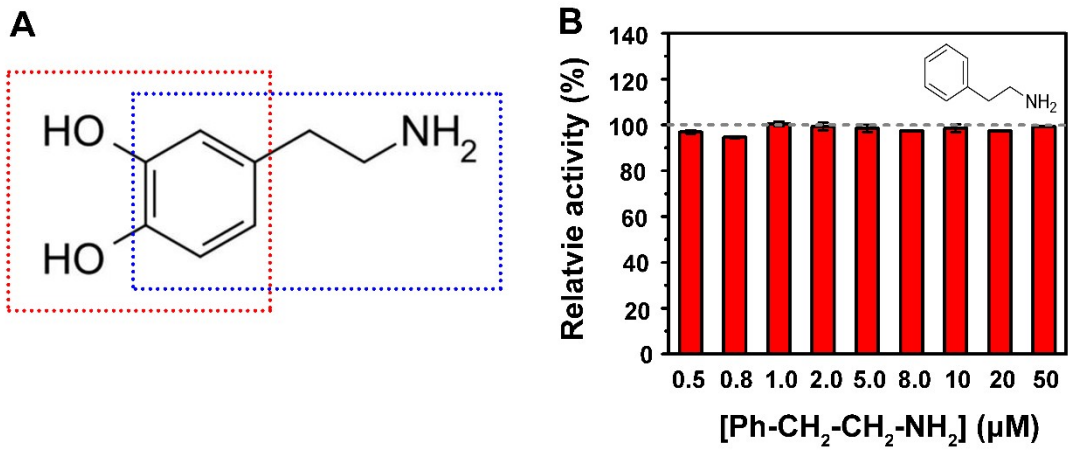

Fig. S6 (A) The molecular formula of dopamine; (B) The effect of Ph-CH_2-CH_2-NH_2 with the concentration range of 0.5 μM—50 μM to MoS_2-MIL-101(Fe) catalyzed H_2O_2-TMB system.

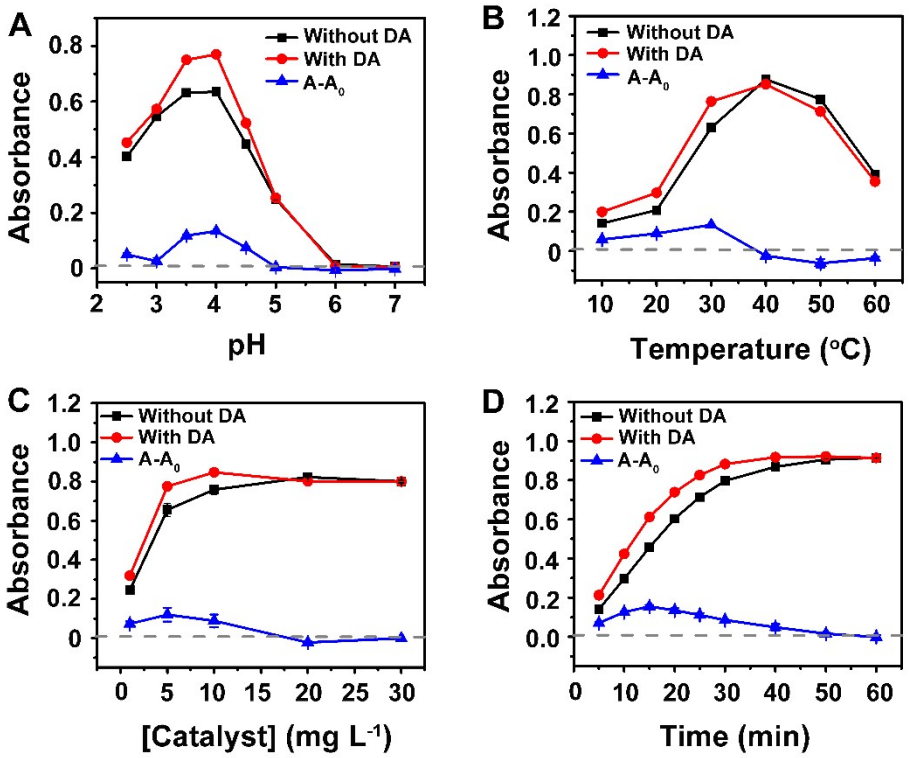

Fig. S7 The change of the absorbance of MoS_2-MIL-101(Fe)-H_2O_2-TMB system in the absence and presence of 0.5 μM DA with (A) pH change, (B) temperature change, (C) catalyst concentration change and (D) reaction time change.

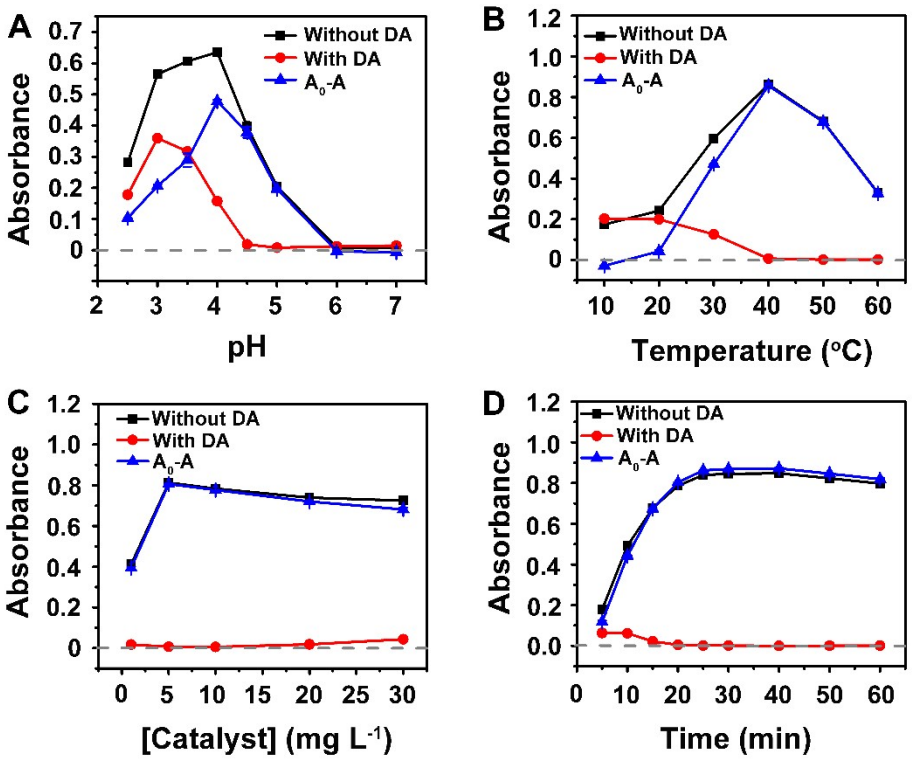

Fig. S8 The change of the absorbance of MoS_2-MIL-101(Fe)-H_2O_2-TMB system in the absence and presence of 50 μM DA with (A) pH change, (B) temperature change, (C) catalyst concentration change and (D) reaction time change.

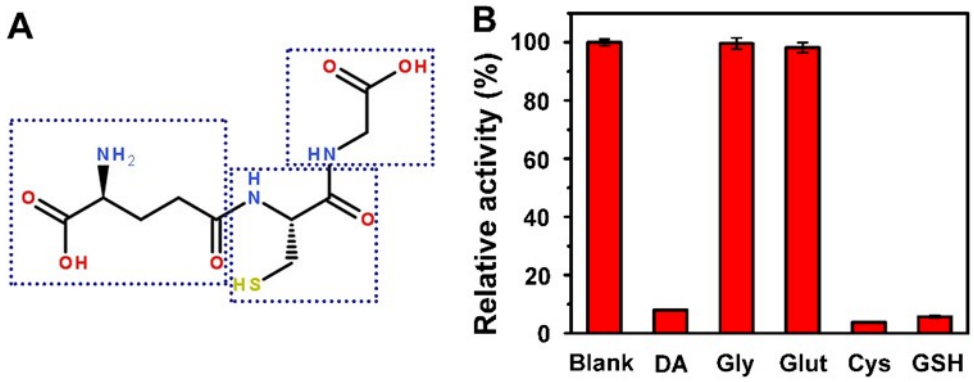

Fig. S9 (A) The molecular formula of GSH; (B) The absorbance response of the MoS_2-MIL-101(Fe)-H_2O_2-TMB system to dopamine (DA), glycine (Gly), glutamic acid (Glut), cysteine (Cys) and glutathione (GSH) with the concentration of 50 μM.

Table S1 Results for the determination of DA in dopamine hydrochloride injection (n=3).

No.	Labeled (M)	Detected (M)	RSD (%)
1	0.210	0.214±0.009	4.3
2	0.053	0.048±0.002	4.6