Supporting Information for

Detection of Hydrogen Peroxide and Glucose with a Novel Fluorescence Probe by the Enzymatic Reaction of Amino Functionalized MOFs Nanosheets

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Supporting Figures
Supporting Tables

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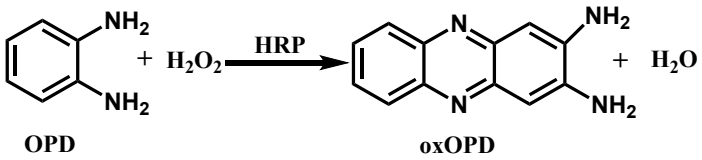
Scheme S1. O-phenylenediamine (OPD) was oxidized as 2,3-diaminophenazine (oxOPD) when Horseradish Peroxidase (HRP) and Hydrogen Peroxide (H_2O_2) were added.



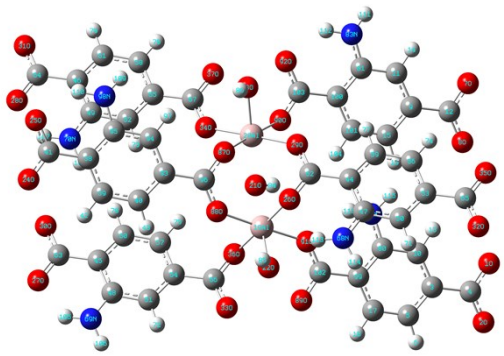


Fig. S1A. The partial structure of the NH_2-MIL-53(Al) nanosheets. The fragments are classified as: (1) 19,20; (2) 21-23,84-86; (3) 33,36,66; (4) 45,48,51,54,57,60,72,75,78; (5) 27,30,63; (6) 69,105,106; (7) 34,37,67; (8) 46,49,52,55,58,61,73,76,79; (9) 28,31,64; (10) 70,107,108; (11) 89,91,102; (12) 3,5,6,10,13,17,18,80,99; (13) 1,2,4; (14) 82,115,116; (15) 90,92,103; (16) 9,11,14-16,81,100,101,104; (17) 7,8,12; (18) 83,111,112; (19) 87,88,96; (20) 38-40,42,43,93-95,97; (21) 24,25,41; (22) 98,109,110; (23) 26,29,62; (24) 44,47,50,53,56,59,71,74,77; (25) 32,35,65; (26) 68,113,114.

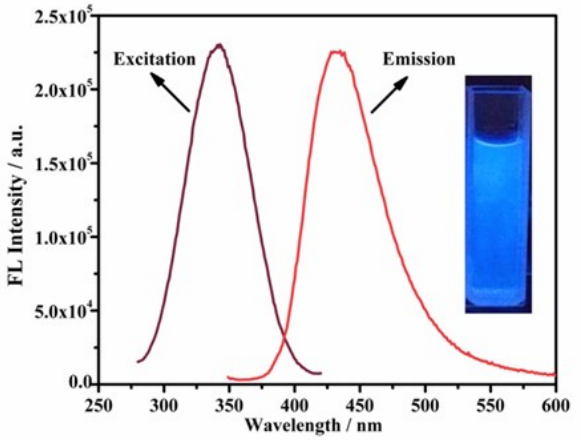


Fig. S1B. The fluorescence emission(red), and excitation spectra(purple) of the nanosheets. Inset shows the color of the nanosheets solution under 365 nm UV light.

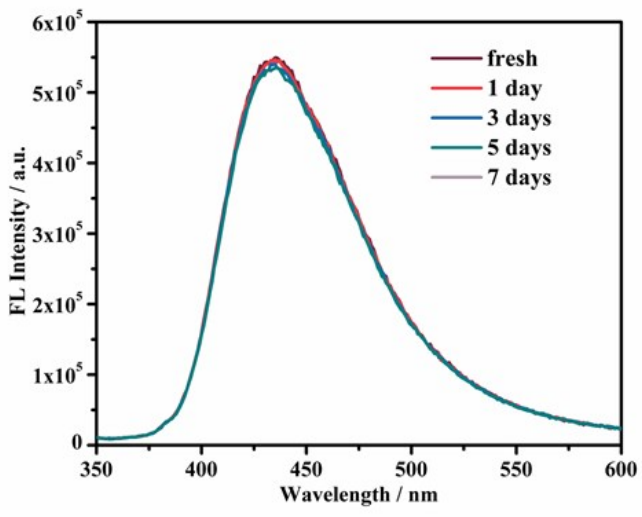


Fig. S2. The fluorescence emission spectra (λ_{ex}=339 nm) of the NH_2-MIL-53(Al) nanosheets at the different time.

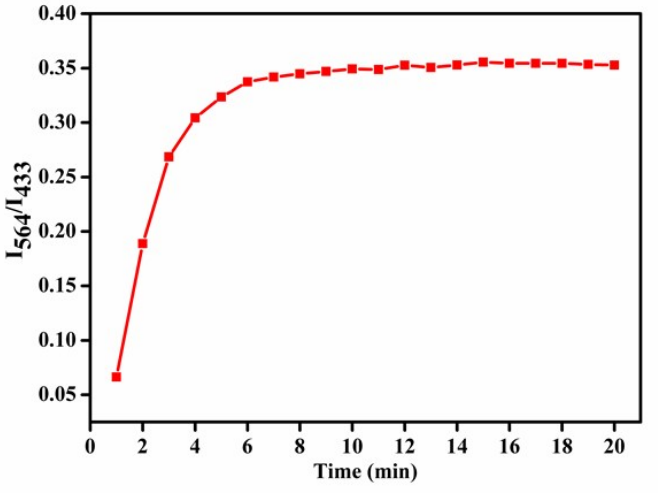


Fig. S3. The fluorescence emission intensity of NH_2-MIL-53(Al) nanosheets at different time (0-20 min) for detecting H_2O_2 (λex=339 nm).

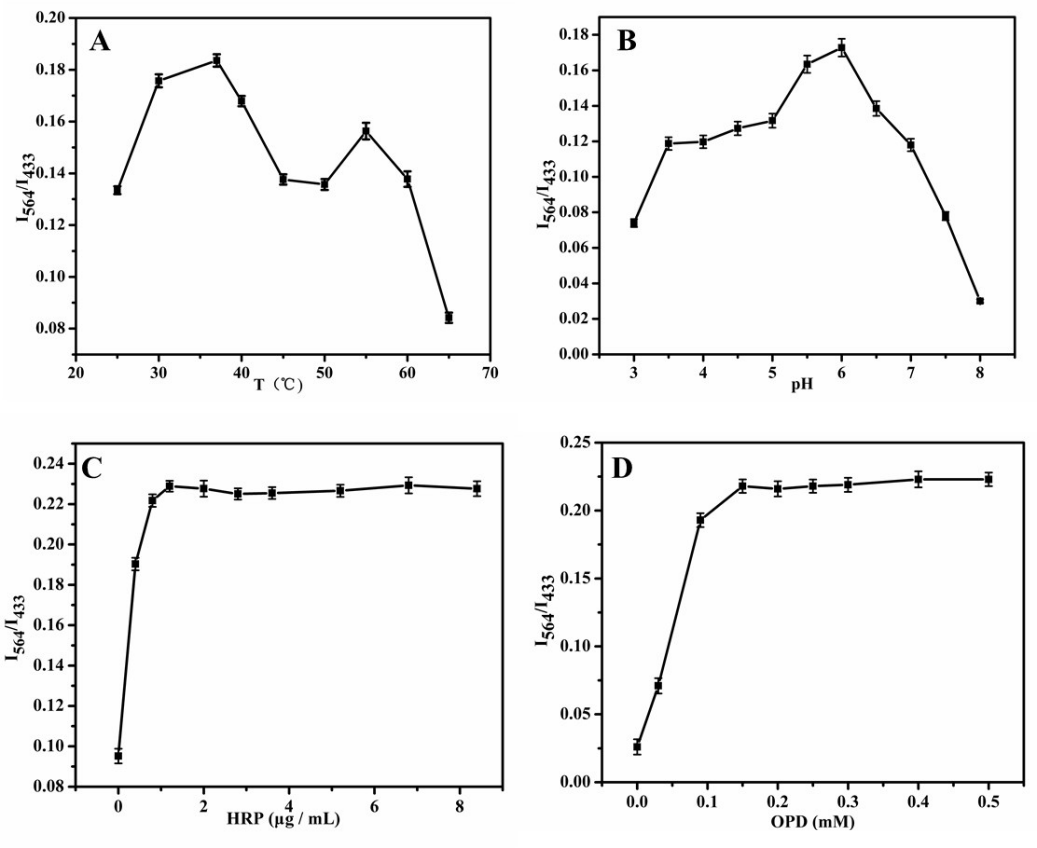


Fig. S4. The optimization of the experimental conditions during the detection process. NH_2-MIL-53(Al) nanosheets (5μg/mL). (A) Temperature, (B) pH, (C) HRP, (D) OPD.

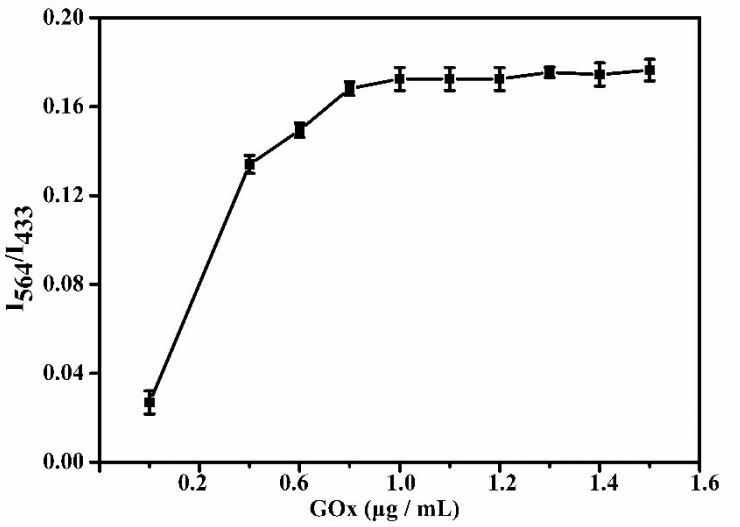


Fig. S5. The optimization of the glucose concentration.

Table S1. This method was compared to other reported glucose detection methods.

Fluoresceng probes	Linear range (μM)	LOD (μM)	Ref.
g-C_3N_4	0.099-36.5	0.4	1
Obaph and pHAQB	0.08-420	11	2
UCNPs	7-340	2.3	3
Mn^{2+}doped-CdTe/ZnS	0.0001-10	1.1	4
GOQD	2.5-7.5	0.65	5
CdTe/ZnTe/ZnS	0.4-20	50	6
Carbon Quantum Dots	0.01-0.15	3.5	7
NH_2-MIL-53(Al) ratiometric probe	4-40	0.041	This work

References

[1] J.W. Liu, Y. Luo, Y.M. Wang, L.Y. Duan, J.H. Jiang, R.Q. Yu, Graphitic carbon nitride nanosheets-based ratiometric fluorescent probe for highly sensitive detection of H_2O_2 and glucose, ACS Appl. Mater. Interfaces 8 (2016) 33439-33445.

[2] K. Wannajuk, M. Jamkatoke, T. Tuntulani, B. Tomapatanaget, Highly specific-glucose fluorescence sensing based on boronic anthraquinone derivatives via the GOx enzymatic reaction, Tetrahedron 68 (2012) 8899-8904.

[3] H. Chen, A. Fang, L. He, Y. Zhang, S. Yao, Sensitive fluorescent detection of H_2O_2 and glucose in human serum based on inner filter effect of squaric acid-iron(III) on the fluorescence of upconversion nanoparticle, Talanta 164 (2016) 580-587.

[4] S.K. Vaishanav, J. Korram, R. Nagwanshi, K.K. Ghosh, M.L. Satnami, Mn^{2+} doped-CdTe/ZnS modified fluorescence nanosensor for detection of glucose, Sensor Actuat B-Chem. 245 (2017) 196-204.

[5] W. Na, H. Liu, M. Wang, X. Su, A boronic acid based glucose assay based on the suppression of the inner filter effect of gold nanoparticles on the orange fluorescence of graphene oxide quantum dots, Microchim. Acta 184 (2017) 1463-1470.

[6] W.T. Wu, T. Zhou, A. Berliner, P. Banerjee, S.Q. Zhou, Glucose-mediated assembly of phenylboronic acid modified CdTe/ZnTe/ZnS quantum dots for intracellular glucose probing, Angew. Chem. Int. Edit. 49 (2010) 6554-6558.

[7] D.H. He, C.B. Zheng, Q. Wang, C.L. He, Y.I. Lee, L. Wu, X.D. Hou, Dielectric barrier discharge-assisted one-pot synthesis of carbon quantum dots as fluorescent probes for selective and sensitive detection of hydrogen peroxide and glucose, Talanta 142 (2015) 51-56.