Electronic Supplementary Information

Facile Synthesis of Metal-Organic Framework-Derived $SiW_{12}@Co_3O_4$ and its Peroxidase-Like Activity in Colorimetric Assay

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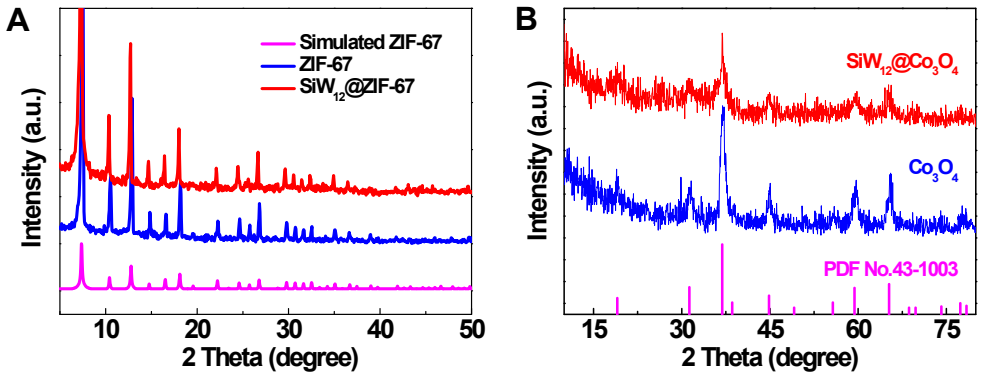

Fig. S1 XRD curves of (A) ZIF-67 and SiW_{12}@ZIF-67, (B) Co_3O_4 and SiW_{12}@Co_3O_4.

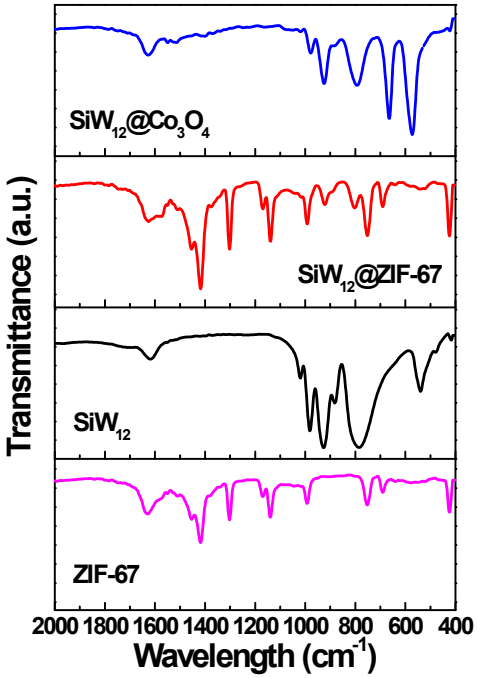

Fig. S2 IR spectra of ZIF-67, SiW_{12}, SiW_{12}@ZIF-67 and SiW_{12}@Co_3O_4.

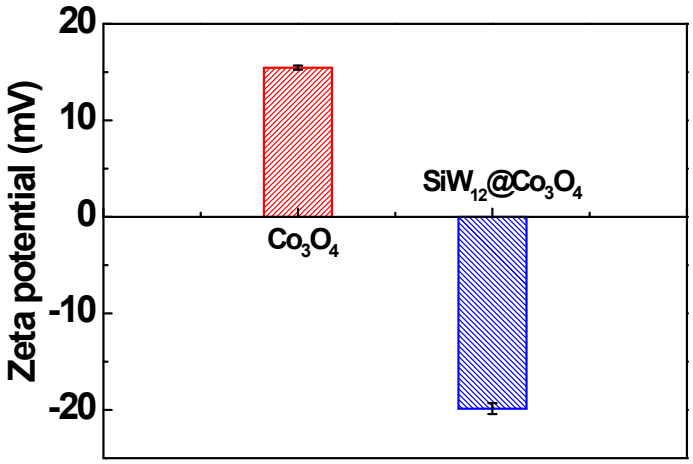

Fig. S3 Zeta potential of Co_3O_4 and $SiW_{12}@Co_3O_4$.

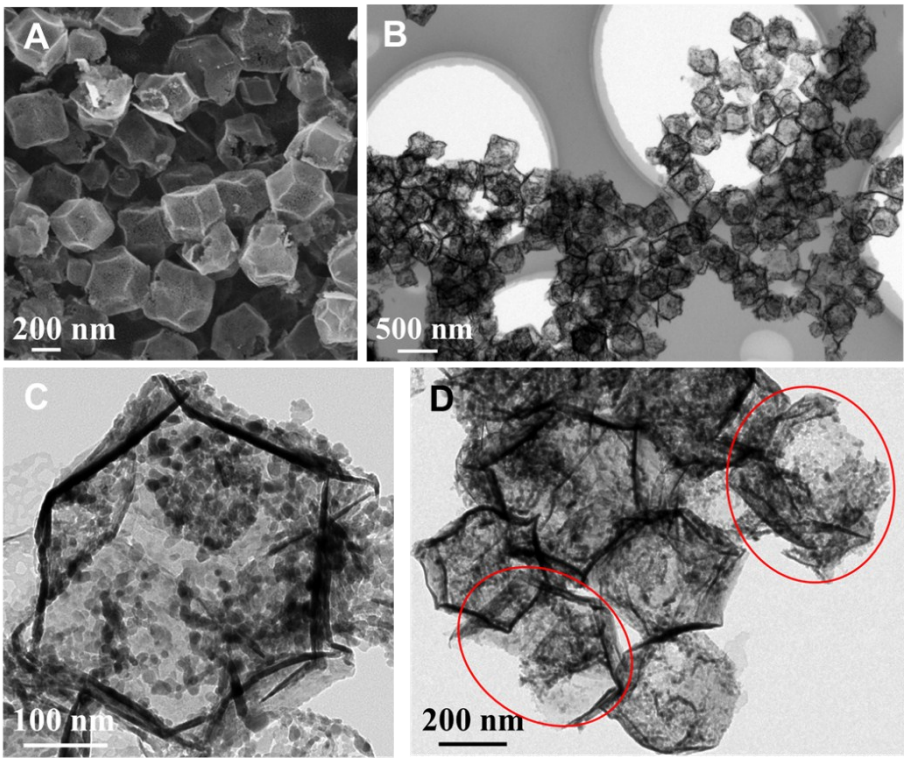

Fig. S4 (A) SEM images of Co_3O_4. (B), (C) and (D) TEM images of Co_3O_4.

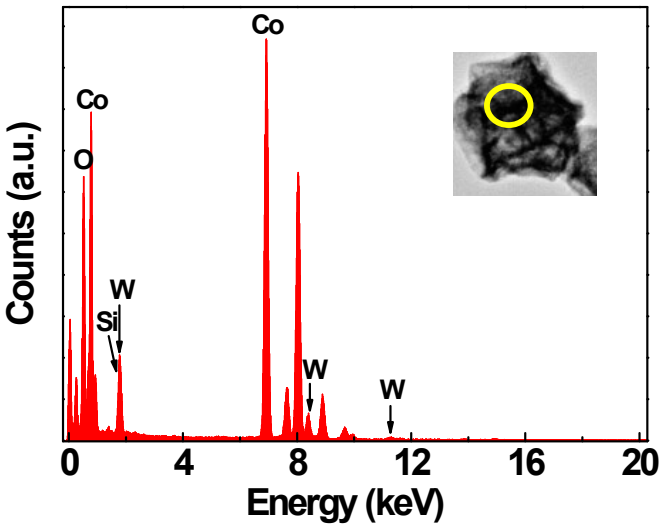

Fig. S5 EDS spectrum of $SiW_{12}@Co_3O_4$.

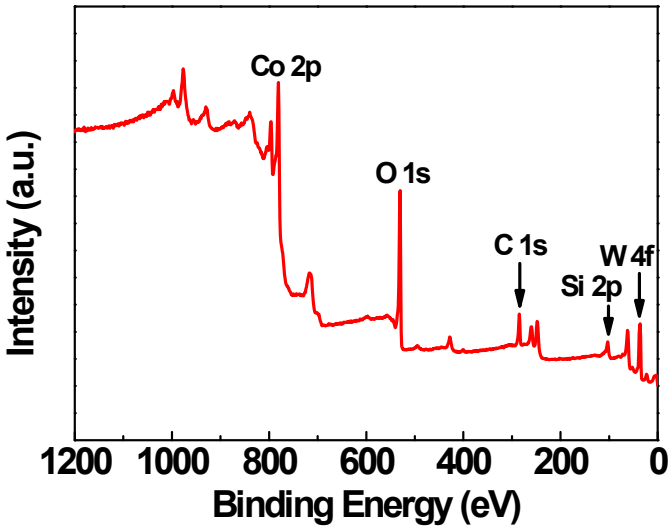

Fig. S6 XPS full survey spectrum of $SiW_{12}@Co_3O_4$.

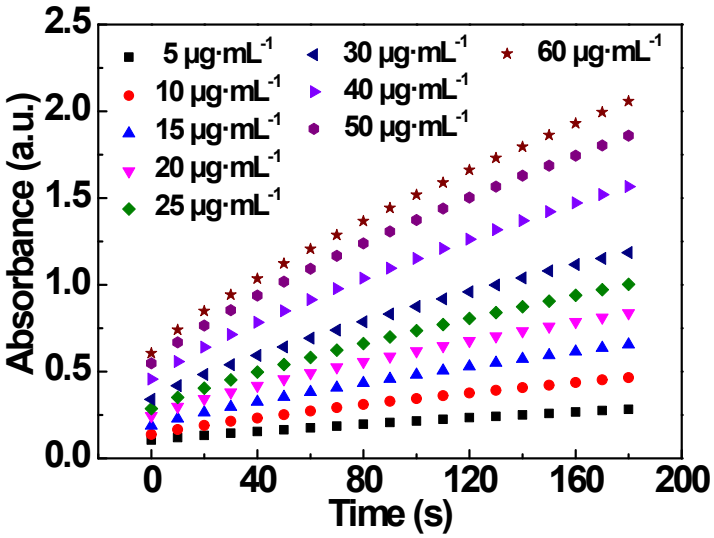

Fig. S7 Absorbance at 652 nm changing with time with different $SiW_{12}@Co_3O_4$ dosages.

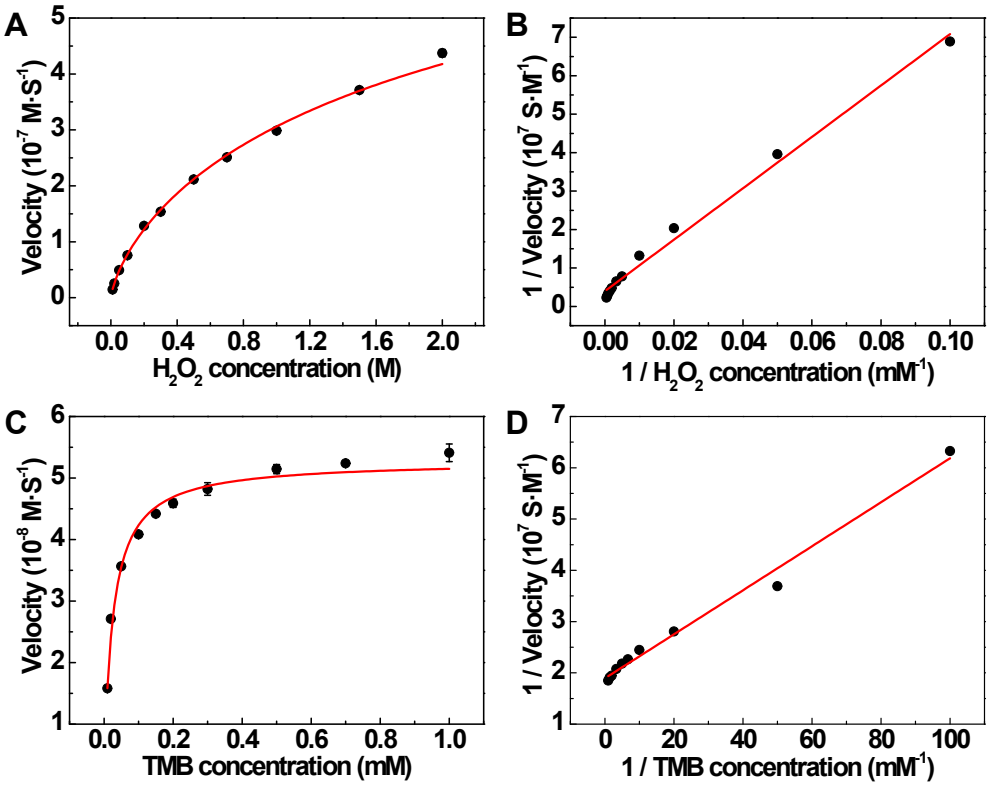

Fig. S8 Steady-state kinetic of $SiW_{12}@Co_3O_4$.

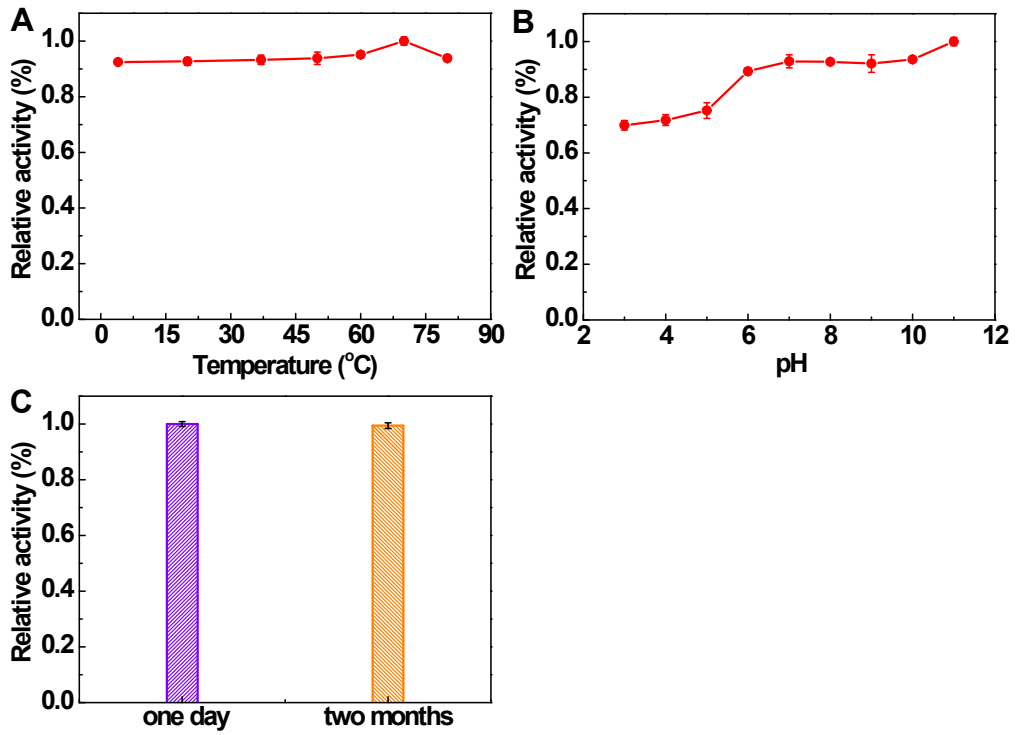

Fig. S9 Relative peroxidase-mimicking activity of $SiW_{12}@Co_3O_4$ after incubation for 2 h at various (A) temperatures and (B) pH. (C) Relative activity of $SiW_{12}@Co_3O_4$ after being stored in water for different times.

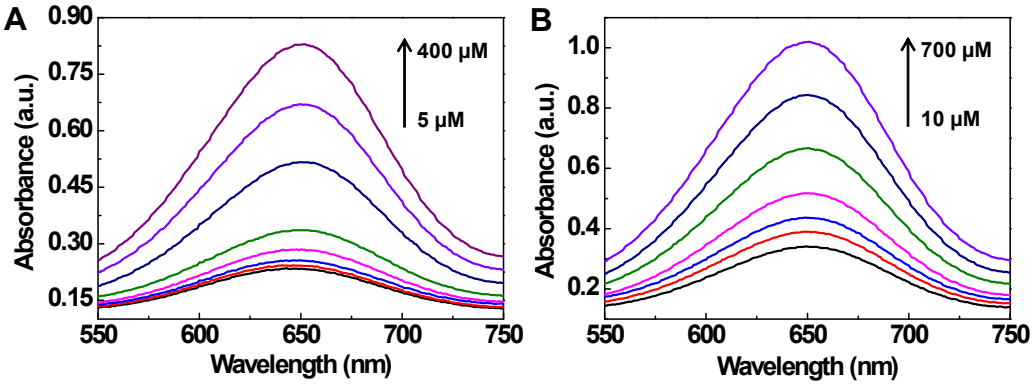

Fig. S10 The absorption spectra of oxidation product of TMB in various (A) H_2O_2 concentrations (5, 10, 20, 50, 100, 200, 300, and 400 μM) and (B) glucose concentrations (10, 50,100, 200, 300, 500, and 700 μM).

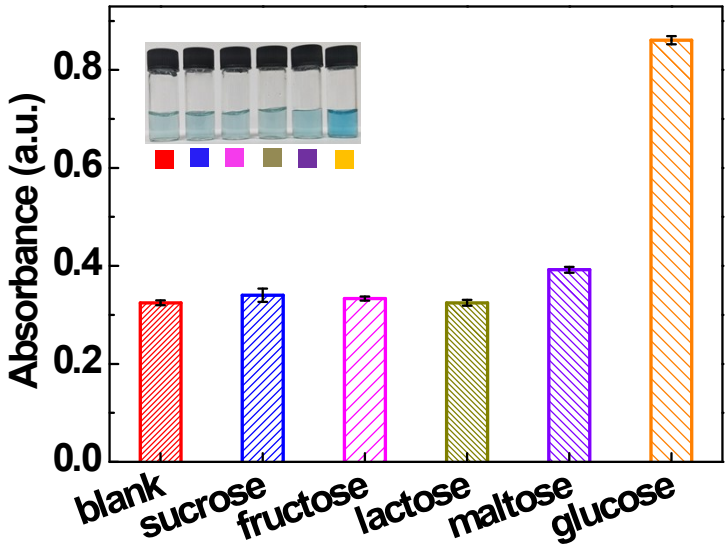

Fig. S11 Selectivity of colorimetric methods for glucose. Inset image: photographs of corresponding solutions.

Table S1 Kinetic parameters of $SiW_{12}@Co_3O_4$ and HRP.

Catalysts	K_m [mM]		V_{max} [10^{-8}M s^{-1}]		Reference
	H_2O_2	TMB	H_2O_2	TMB	
HRP	3.7	0.434	8.71	10.00	[1]
$SiW_{12}@Co_3O_4$	167.8	0.023	25.1	5.3	This work

Table S2 Performance comparison between the proposed sensing method and other H_2O_2 and glucose colorimetric sensors.

Catalysts	H_2O_2 detection (μM)		Glucose detection (μM)		Reference
	Linear range	Detection limit	Linear range	Detection limit	
Co_3O_4-MMT NPS	10-100	8.7	—	—	2
Cu NCs	10-1000	10	100-2000	100	3
Au@Pt NRs	45-1000	45	45-400	45	4
N-GODs	20-1170	5.3	25-375	16	5
H_2TCPP-NiO	20-100	8.0	50-500	20	6
CeO_2/NT-TiO_2@0.1	5-100	3.2	10-500	6.1	7
NiFe-LDHNS	10-500	4.4	50-2000	23	8
GO-FeTPyP	20-500	72	—	—	9
CuO-Au	—	—	0-30	6.75	10
SiW_{12}@Co_3O_4	5-400	1.0	10-700	3.3	This work

Table S3 Determination of glucose in orange juice and human urine.

Samples	Spiked (mM)	Found (mM)	Recovery (%)	RSD (%, n=3)
Orange juice	0	0.209	—	2.8
	0.1	0.312	103	0.8
	0.2	0.412	102	1.6
	0.3	0.515	102	1.7
Urine	0	0	—	—
	0.1	0.104	104	2.4
	0.2	0.203	102	1.6
	0.3	0.321	107	2.4

References

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