Electronic Supplementary Information

One-step synthesis of copper-based metal-organic framework–graphene nanocomposite with enhanced electrocatalytic activity

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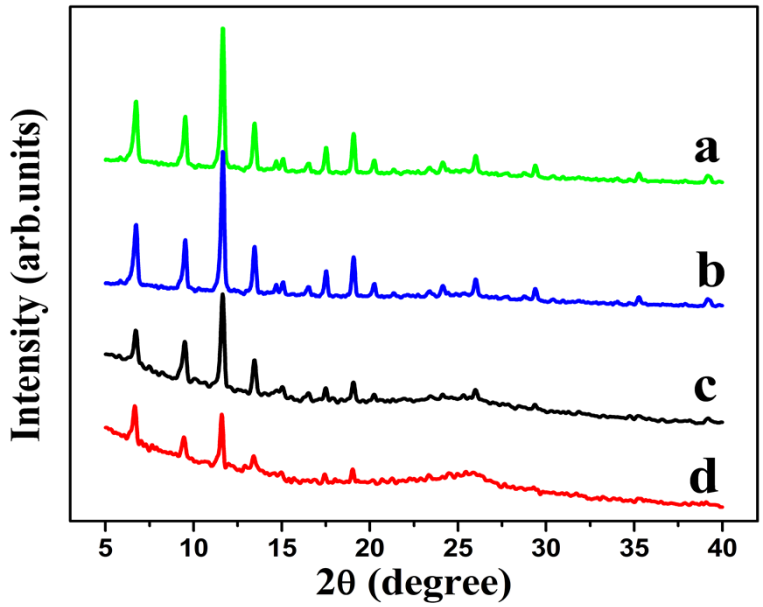
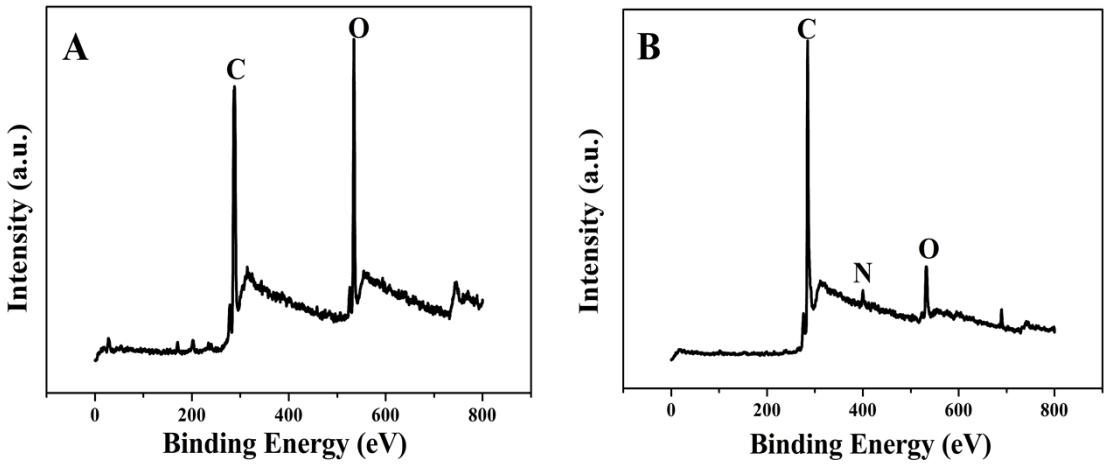


Fig. S1. XRD patterns of Cu-MOF-GN-1 (a), Cu-MOF-GN-2 (b), Cu-MOF-GN-3 (c) and Cu-MOF-GN-4 (d).



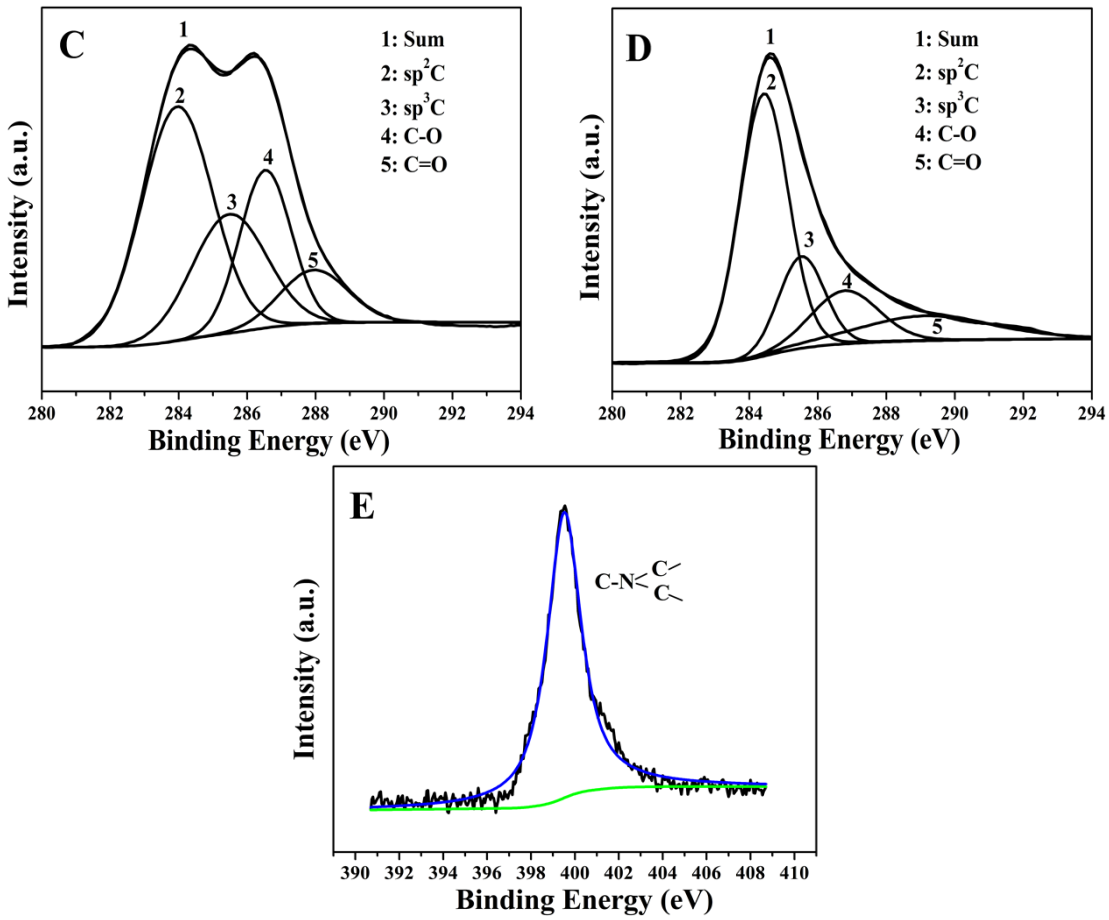


Fig. S2. Survey X-ray photoelectron spectra and the corresponding C 1s XPS spectra of GO (A, C) and GN (B, D). (E) The corresponding N 1s XPS spectra of GN.

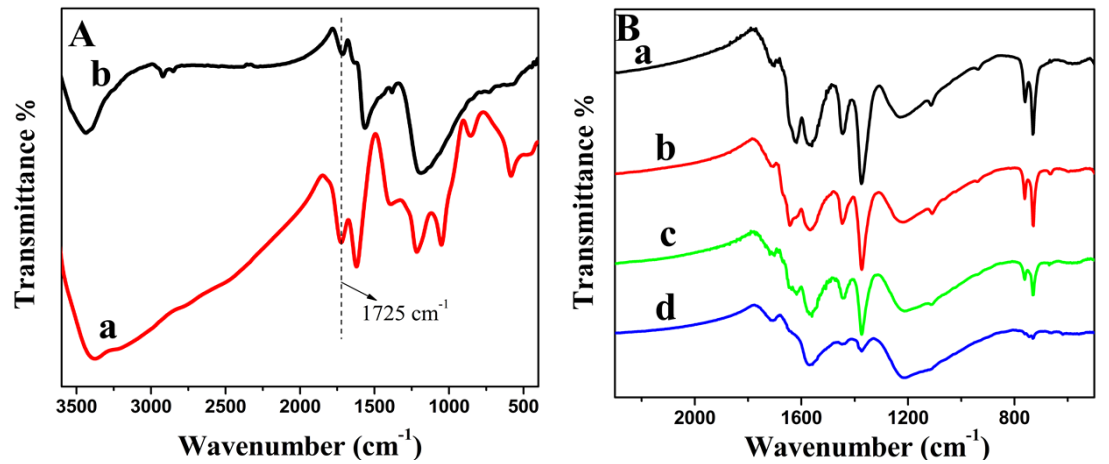


Fig. S3. (A) FT-IR spectra of GO (a) and GN (b); (B) FT-IR spectra of Cu-MOF-GN-1 (a), Cu-MOF-GN-2 (b), Cu-MOF-GN-3 (c) and Cu-MOF-GN-4 (d).

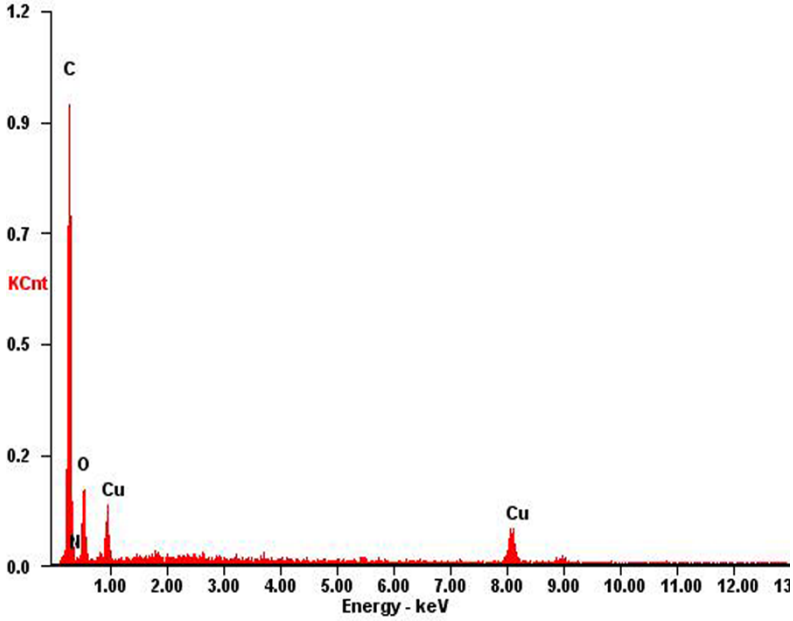


Fig. S4. EDX spectrum of Cu-MOF-GN-3.

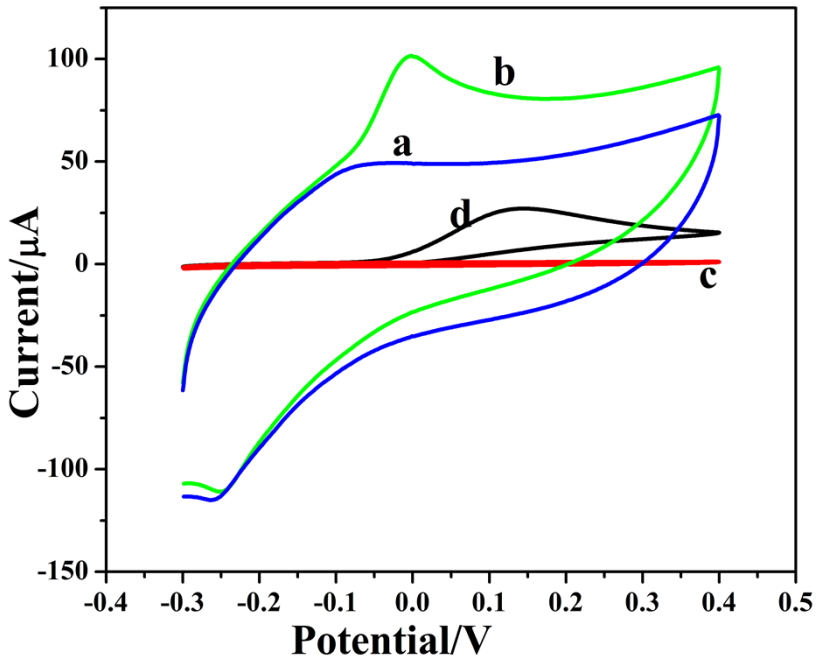


Fig. S5. CVs of Cu-MOF-GN-3/GCE and GCE in PBS (pH=7.0) containing 0 (a, c) and 3 mM (b, d) AA, respectively.

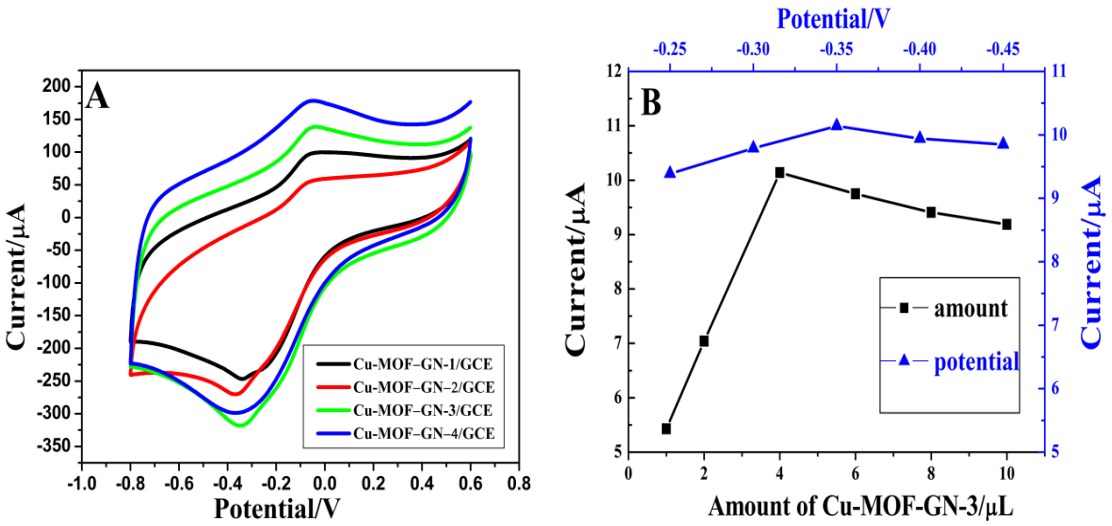


Fig. S6. (A) CVs of Cu-MOF-GN-x/GCE in PBS (pH=7.0) containing 5 mM H_2O_2; (B) influences of the amount of Cu-MOF-GN-3 nanocomposite (blank line) and the operating potential (blue line) on the response current of 0.15 mM H_2O_2.

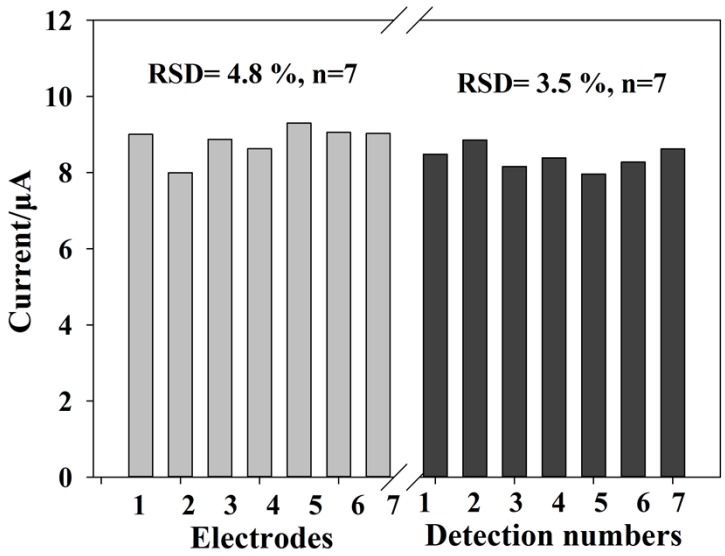


Fig. S7. Current response of seven different Cu-MOF-GN-3/GCEs and one electrode for seven successive measurements to 0.1 mM H_2O_2.

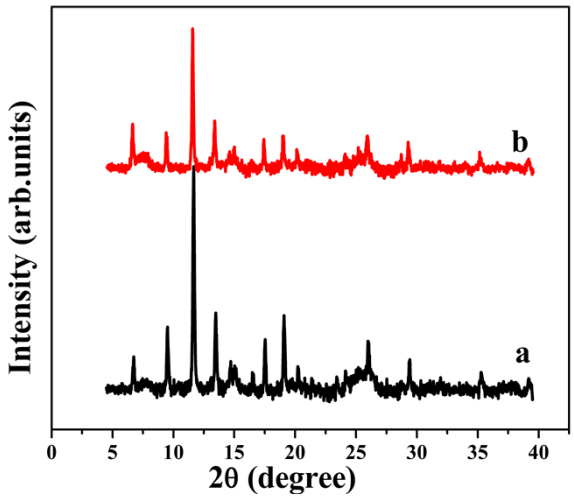


Fig. S8. XRD patterns of Cu-MOF-GN-3 before (a) and after (b) electrochemical detection.

Table S1 Comparison of the performance of the Cu-MOF-GN-3/GCE with other previously reported H_2O_2 sensors

Electrode	Potential(V)	Linear range (μM)	Detection limit (μM)	Sensitivity (μA mM^{-1})	Response time (s)	Ref.
Cu_2O/GNs/GCE[a]	-0.4	300-7800	20.8	-	7	1
Mb/CeO_2/ITO[b]	-0.3	0.6-3000	0.6	13.54	8	2
Cu/PSi-CPE[c]	-0.2	0.5-3780	0.27	13.09	5	3
IL-GP-TPMATA-$CuCl_{2(IL)}$/SPCE[d]	-0.1	0.5-364	0.25	25	-	4
CuS/GCE[e]	-0.65	10-1900	1.1	62.93	20	5
CQDs/Cu_2O/GCE[f]	-0.2	5-5300	2.8	9.02	10	6
MP-11/MWCNTs-BC[g]	-0.3	0.1-257.6	0.1	247 (μA$mM^{-1}cm^2$)	3	7
Pt/CNF[h]	0	1-800	0.6	-	-	8
Pt/PIL/OMCs[i]	-0.24	0.1-3200	0.8	24.43	4-5	9
Hb/SA-MWCNTs/GCE[j]	-0.4	40-200	16.41	15.87	10	10
Cu-MOFs-MPC/GCE[k]	-0.22	10-11600	3.2	2.97	2	11
Cu-MOF-GN-3/GCE	-0.35	10-11180	2	57.73	3	This work

a cubic Cu_2O nanocrystals/graphene hybrid modified glassy carbon electrode

b myoglobin (Mb)/porous cerium dioxide(CeO_2) nanostructured film electrodeposited on an indium tin oxide (ITO) substrate

c copper on porous silicon (Cu/PSi) nanocomposite powder modified carbon paste

electrode (CPE)

d dissolving 2,4,6-tris(2-pyridylmethylamino)-1,3,5-triazine (TPMATA) and $CuCl_2$ in ionic liquid (IL) modified IL-graphite powder (GP)-screen printed carbon electrode (SPCE)

e CuS nanoparticles modified GCE

f carbon quantum dots (CQDs)/octahedral cuprous oxide (Cu_2O) nanocomposites/ GCE

g microperoxidase-11/ bacterial cellulose (BC) functionalized by MWCNTs

h Pt nanoparticle loaded carbon nanofiber

i Pt/Poly(ionic liquid) (PIL) coated ordered mesoporous carbons (OMCs)

j hemoglobin (Hb) immobilized sodium alginate (SA)- MWCNTs modified GCE

k Cu-based metal-organic framework- macroporous carbon (MPC) hybrid modified GCE

l Cu-bipy-BTC- MWCNTs modified GCE

Table S2 Comparison of the performance of the Cu-MOF-GN-3/GCE with other previously reported AA sensors

Electrode	Potential(V)	Linear range (μM)	Detection limit (μM)	Sensitivity ($\mu A\ mM^{-1}$)	Ref.
Cu-MOFs-MPC/GCE[a]	0.04	10-2360	3.5	83.64	[12]
N-PCNPs/GCE[b]	-0.04	80-2000	0.74	14.9	[13]
NG/GCE[c]	0	5-1300	2.2	27.55	[14]
PANI/SPCE[d]	0.38	30-270	30	17.7	[15]
Pd NWs/GCE[e]	0	25-900	0.2	166.5 μA $mM\ cm^{-2}$	[16]
Cu-MOF-GN-3/GCE	-0.02	0.5-6965.5	0.02	18.25	this work

a Cu-based metal-organic framework− MPC hybrid modified GCE

b Nitrogen doped porous carbon nanopolyhedra (N-PCNPs) prepared from direct carbonization of Zn-MOF modified GCE

c Nitrogen doped graphene modified GCE

d Polyaniline modified screen printed carbon electrode

e Pd nanowires (Pd NWs) modified GCE

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