Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Electrocatalytically active cobalt-based metal-organic framework with incorporated macroporous carbon composite for electrochemical applications

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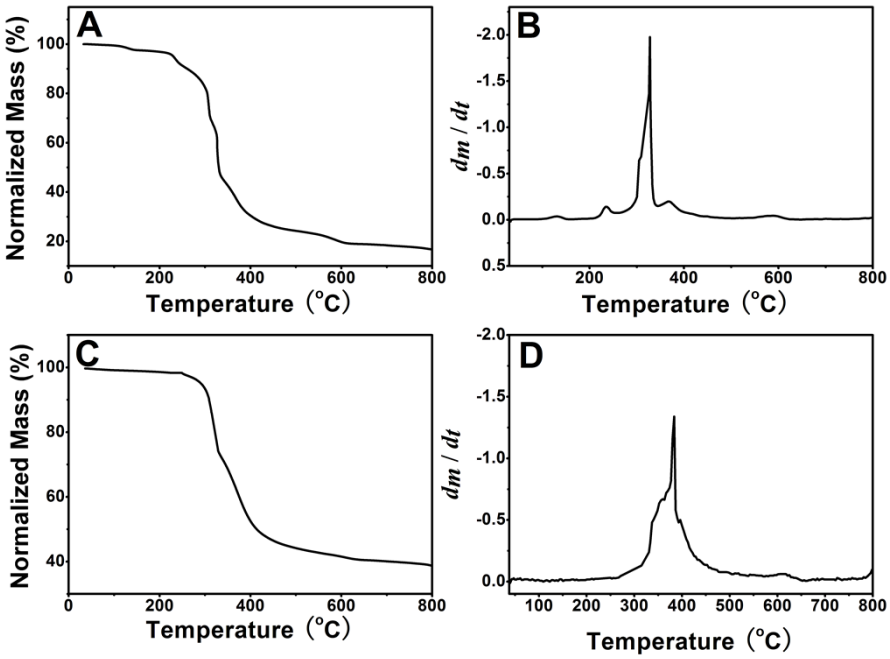

Figure S1 TGA and DTG curves of Co-MOF-MPC-*1* (A and B) and Co-MOF-MPC-*3* (C and D) at air atmosphere.

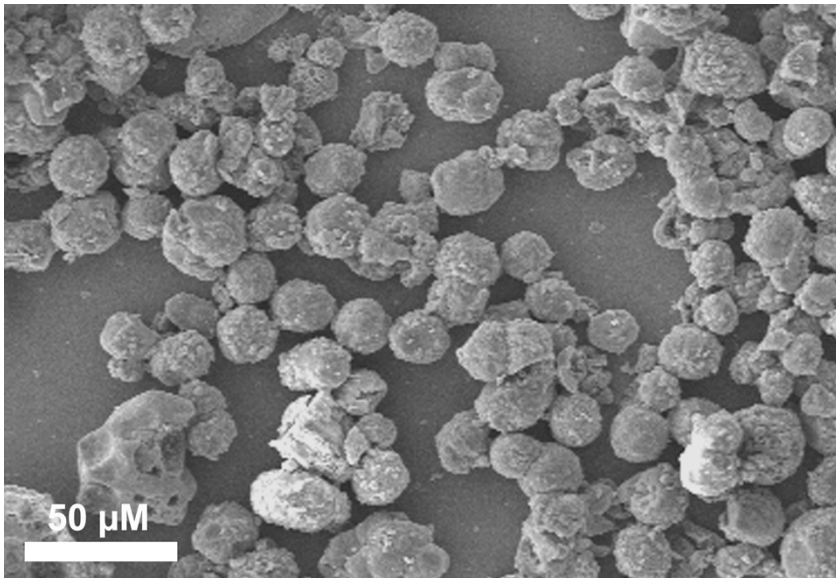

Figure S2 SEM images of pure Co-MOF.

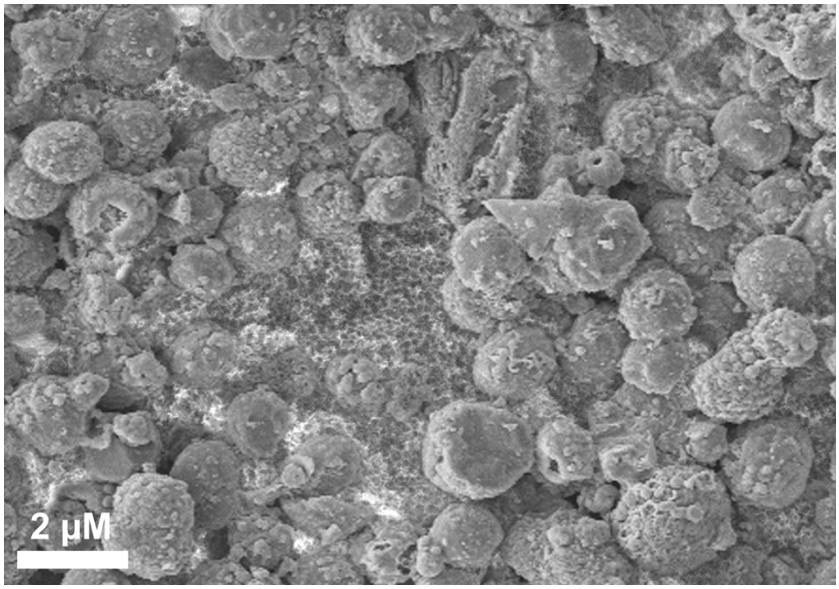

Figure S3 SEM images of Co-MOF-MPC-*2*.

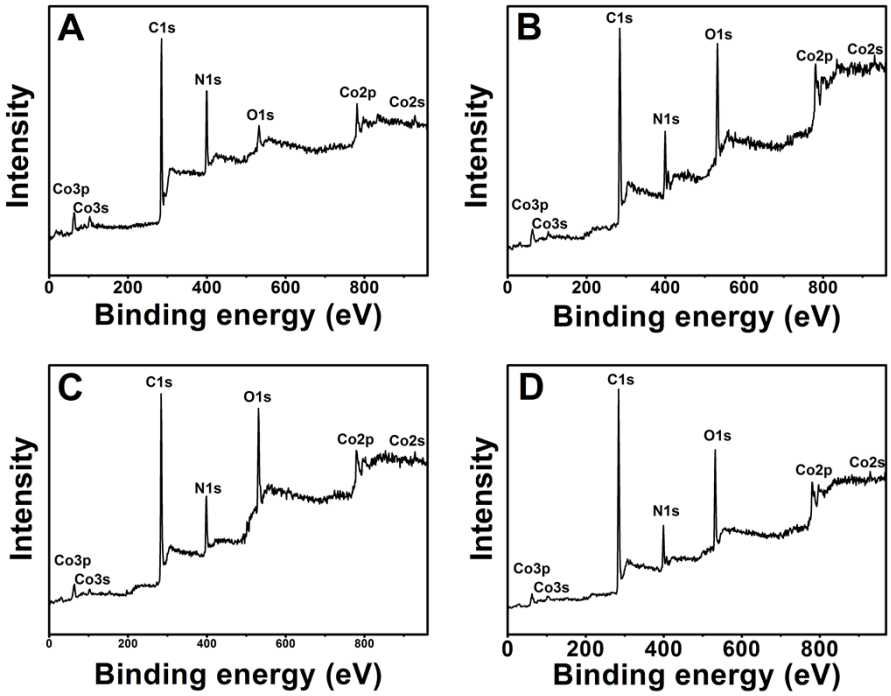

Figure S4 The wide survey spectrums of pure Co-MOF (A) as well as Co-MOF-MPC-*1*, *2*, and *3* (B, C, and D).

Table S1 Elemental components of pure Co-MOF and Co-MOF-MPC-*x*

Samples	XPS (at %)			
	C	N	Co	O
Co-MOF	57.41	30.78	8.56	3.26
Co-MOF-MPC-*1*	60.94	23.44	4.67	9.26
Co-MOF-MPC-*2*	64.02	20.01	3.99	11.98
Co-MOF-MPC-*3*	65.91	17.05	3.41	13.64

Table S2 Comparison of the R_{ct} and response to $K_3Fe(CN)_6/K_4Fe(CN)_6$ with different electrodes (for five determinations)

Electrode	bare GCE	MPC-GCE	Co-MOF-GCE	Co-MOF-MPC-*1*-GCE	Co-MOF-MPC-*2*-GCE	Co-MOF-MPC-*3*-GCE
R_{ct} (Ω)	463.2	5.9	4797.5	141.3	69.8	61.1

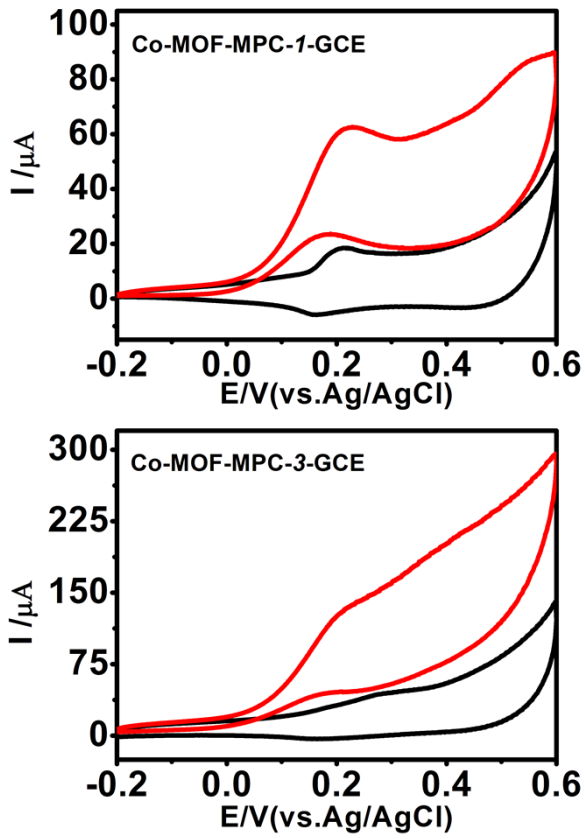

Figure S5 CVs of Co-MOF-MPC-*1* (A) and Co-MOF-MPC-*3* (B) in the absence (black line) and presence (red line) of 0.5 mM hydrazine; 0.1 M NaOH; Scan rate: 50 mV s^{-1}.

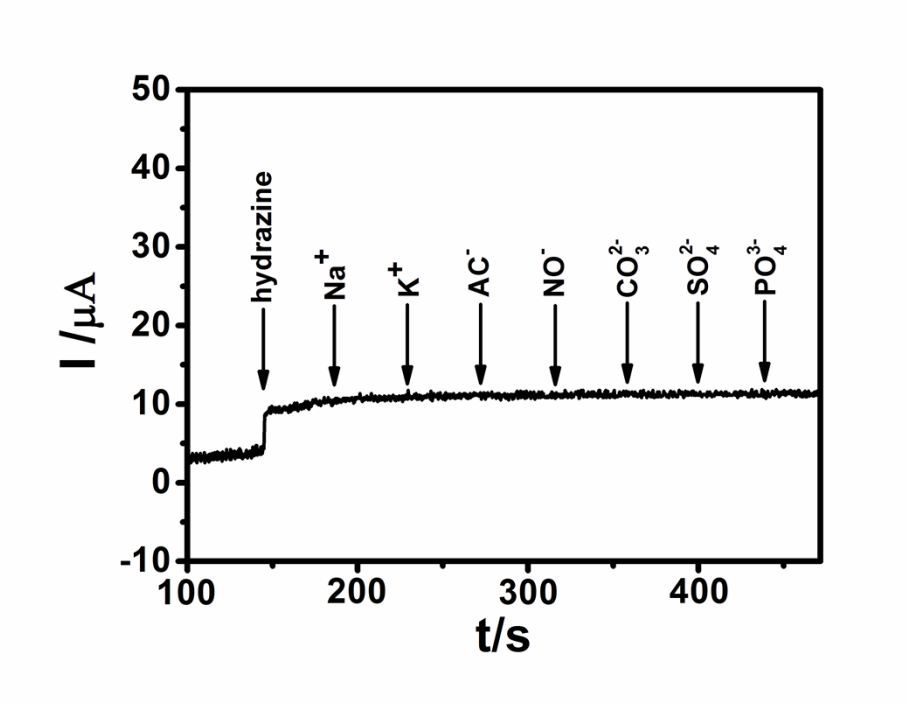

Figure S6 i-t curves of Co-MOF-MPC-*2*-GCE with addition of several possible interferences for hydrazine.

Table S3 Comparison of the performance of the Co-MOF-MPC-*2*-GCE for the electrochemical detection of hydrazine with that of other modified electrodes

Working electrode	potential (V)	Linear range (μM)	sensitivity (μA mM^{-1})	Limit of detection (μM)	Reference
Co–GE/GCE	0.3	0.25–370, 370–2200	39.93	0.1	1
Manganese hexacyanoferrate	0.45	33.3-8180	47.53	6.65	2
Polypyridil and phosphine Ru (II)	0.75	6-1200	NO	1	3
CuO hollow sphere modified Si PNWs-Nafion/GCE	0.7	1-5000	218	0.25	4
GCE/ZnO/MWCNTs	0.4	0.6–250	17.47	0.18	5
PGE/nano-Rh/CNF	0.4	0.5–175	37.42	0.3	6
PCF	0.5	1–550	14.56	0.14	7
CPE/NiHCF/AuNP	0.3	0.5-900	52.99	0.1	8
Co-MOF-MPC-2-GCE	0.2	0.5–630, 630–5400	216.1 132.4	0.18	This work

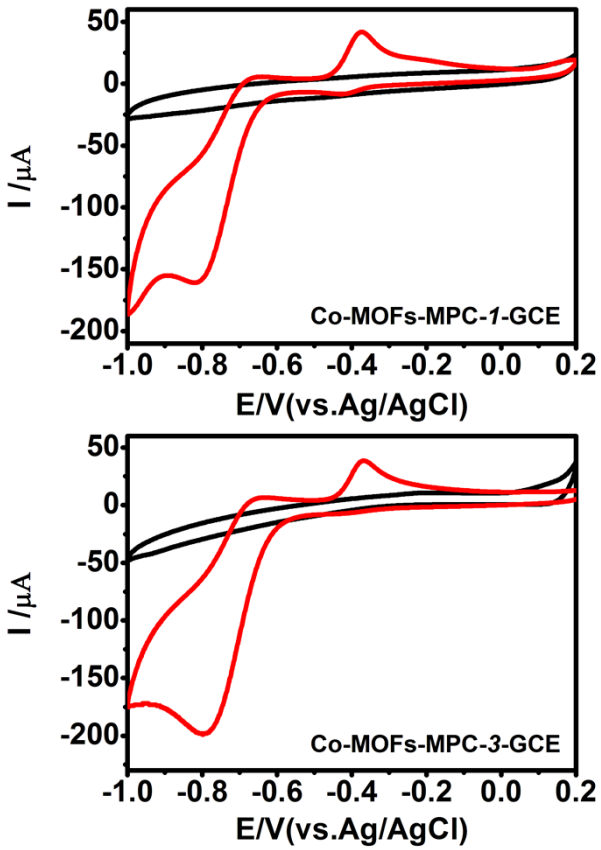

Figure S7 CVs of Co-MOF-MPC-*1* (A) and Co-MOF-MPC-*3* (B) in the absence (black line) and presence (red line) of 100 μM nitrobenzene; 0.1 M NaOH; Scan rate: 50 mV s^{-1}.

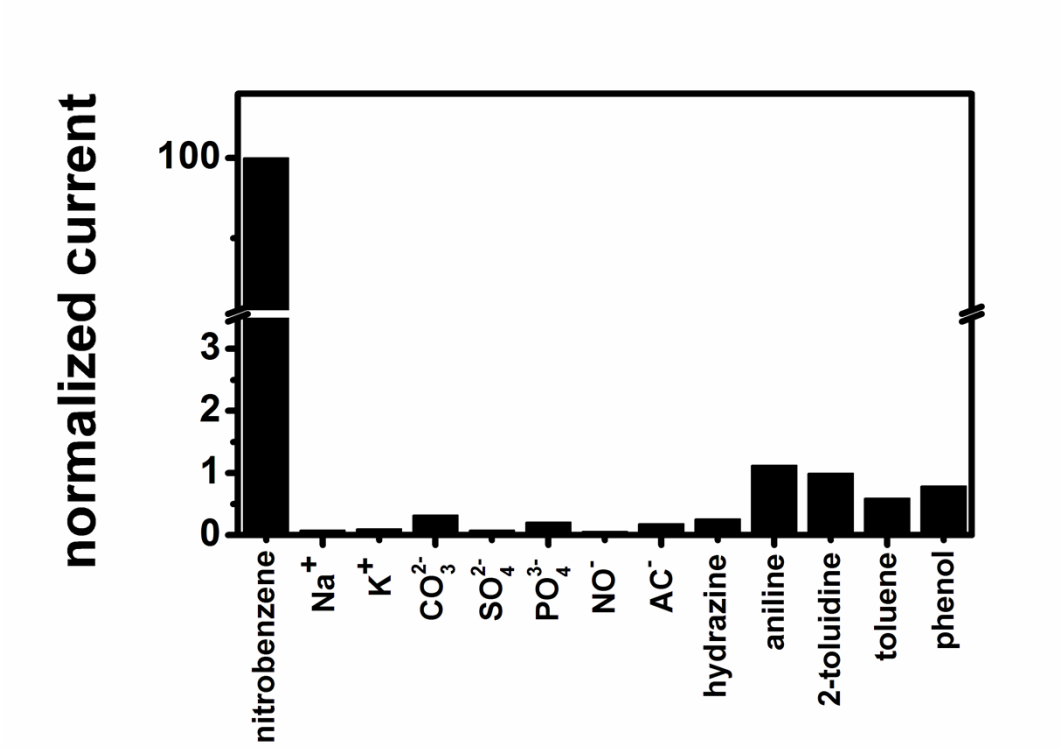

Figure S8 Normalized current of Co-MOF-MPC-*2*-GCE for 100 μM nitrobenzene in the presence of the high concentrations of possible interferents.

Table S4 Comparison of the performance of the Co-MOF-MPC-*2*-GCE for the electrochemical detection of nitrobenzene with that of other modified electrodes

Working electrode	potential (V)	Linear range (μM)	sensitivity (μA mM^{-1})	Limit of detection (μM)	Reference
BiF/CPE	-0.65	1-100	289	0.83	9
HMDE	-0.8	14.7-1000	-	5	10
OMC/DDAB/GCE	-0.5	20-2900	-	10	11
PNMPC/Nafion/GC	-0.7	1-200	6930	0.05	12
MWCNTs/GCE	-0.8	0.08-32.49	-	0.024	13
MMPCMs/GCE	-0.64	0.2-40	2360	0.008	14
SiO_2/Au NPs/GCE	-0.74	0.1-25	102	0.1	15
OMCN-800/GCE	-0.57	0.5-1000	674.87	0.18	16
Co-MOF-MPC-*2*-GCE	-0.77	0.15-15 15-235	1780 1060	0.21	This work

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