Polyoxometalates-mediated facile synthesis of Pt nanoparticles anchored on ordered mesoporous carbon for electrochemical applications

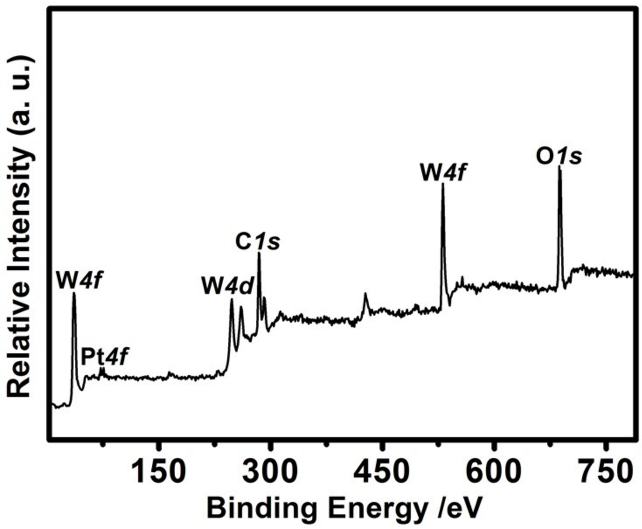

Fig. S1 The wide survey spectrums of Pt@POMs-OMC nanohybrids.

Table S1 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	OMC–GCE	Pt@POMs-OMC–GCE
R_{ct} (Ω)	342.7	15.8	9.6

Table S2 Comparison of the performance of the Pt@POMs-OMC–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
RGO/ZnO–Au/GCE[a]	0.1 (Ag/AgCl)	0.05-5	393.34	0.018	1
PA6/PANI_ZnO/FTO[b]	0.19 (Ag/AgCl)	0.5-5000	61.77	0.35	2
Ag/ZIF-8/CPE[c]	-0.05 (Ag/AgCl)	6-5000	3.87	1.57	3
Co_3O_4 NWs/GCE[d]	0.5 (Ag/AgCl)	20-700	28.63	0.5	4
Nafion–TiO_2–CNT/GCE[e]	0.4 (Ag/AgCl)	0.35-162	58	0.22	5
rGO–PxDA–Pd/GCE[f]	0.1 (Ag/AgCl)	1-7433	15.2	0.17	6
Co_3O_4/MWCNTs/GCE[g]	0.5 (SCE[l])	20-1100	34.5	0.8	7
Pt–Cu@PSi/CILE[h]	0 (Ag/AgCl)	0.2-1680	10.35	0.05	8
PNi-$TPPS_4$-NPs/GCE[i]	0.55 (Ag/AgCl)	1-400	0.99	0.11	9
Au/PDTYB/MWCNTs/GCE[j]	0.08 (Ag/AgCl)	2-350	41.63	0.6	10
PB@Ag/GF[k]	0.3 (Ag/AgCl)	0.5-8.5	26.06	0.49	11
Pt@POMs-OMC–GCE	0 (Ag/AgCl)	10-840	2.92	3.41	This work
		840-1400	7.32		

a Reduced graphene oxide nanosheets/ZnO microspheres–Au nanoparticles modified glassy carbon electrode

b Polyamide 6/polyaniline (PA6/PANI) electrospun nanofibers decorated with ZnO nanoparticles modified fluorine doped tin oxide electrode

c Ag/zeolitic imidazolate frameworks nanocomposite modified glassy carbon electrode

d Porous Co_3O_4 nanowire modified glassy carbon electrode

e Nafion–coated titanium oxide nanoparticle deposition on carbon nanotube surfaces modified glassy carbon electrode

f Graphene functionalized by benzylamine molecules and subsequently palladium modified glassy carbon electrode

g Co_3O_4 nanoparticles decorated on the multi-walled carbon nanotubes modified glassy carbon electrode

h Pt–Cu nanoalloy was supported on the surface of porous silicon modified carbon ionic liquid electrode

i Poly-(5, 10, 15, 20-tetra (4-sulfophenyl) porphyrin–nickel) modified glassy carbon electrode

j Poly (4, 5-dihydro-1, 3-thiazol-2-ylsulfanyl-3-methyl-1, 2-benzenediol)–gold nanoparticles film on multi-walled carbon nanotubes modified glassy carbon electrode

k Prussian blue/silver nanoparticles modified freestanding graphite felt

l Saturated calomel electrode

Table S3 Comparison of the performance of the Pt@POMs-OMC–GCE for the electrochemical detection of H_2O_2 with that of other modified electrodes.

Working electrode	potential (V)	Linear range (μM)	sensitivity (μA mM^{-1})	Limit of detection (μM)	Reference
Cu/PSi/CPE[a]	-0.2 (Ag/AgCl)	0.5-3780	13.09	0.27	12
NP−PtAu/GCE[b]	0.7 (RHE[l])	50-2750	1.43	0.1	13
P*p*PDA@Fe_3O_4/GCE[c]	-0.4 (SCE[m])	0.5-400	76	0.21	14
GF/Co_3O_4−NP/GCE[d]	-0.48 (Ag/AgCl)	0.2-211.5	90.97	0.06	15
TOAB/ZnP*p*−C_{60}/GCE[e]	-1.17 (Ag/AgCl)	35-3400	215.6	0.81	16
HRP/C−Dots/LDHs/GCE[f]	-0.35 (SCE)	0.1-23.1	37.51	0.04	17
Pt/PG/GCE[g]	0.14 (Ag/AgCl)	1-1477	27.22	0.5	18
Au NPs−N−GQDs/GCE[h]	-0.4 (Ag/AgCl)	0.25-13327	14.86	0.12	19
PPy−Pt/GCE[i]	-0.175 (Ag/AgCl)	500-6300	13.16	0.6	20
graphene/pectin−CuNPs/GCE[j]	-0.24 (Ag/AgCl)	1-1000	31.20	0.35	21
Pt−MnO_x@C/GCE[k]	0.4 (Ag/AgCl)	2-4000	9.81	0.7	22
Pt@POMs-OMC–GCE	-0.16 (Ag/AgCl)	5-5400	10.64	1.09	This work

a Copper on porous silicon nanocomposite modified carbon paste electrode

b Nanoporous Pt–Au alloy modified glassy carbon electrode

c Poly(*p*-phenylenediamine) (P*p*PDA)–Fe_3O_4 nanocomposite modified glassy carbon electrode

d Graphene and cobalt oxide nanoparticles composite modified glassy carbon electrode

e Zinc porphyrin–fullerene was entrapped in tetraoctylammonium bromide film modified glassy carbon electrode

f Carbon nanodots and CoFe layered double hydroxide composites modified glassy carbon electrode

g Pt nanoparticles decorated porous grapheme nanocomposite modified glassy carbon electrode

h Au nanoparticles on nitrogen−doped graphene quantum dots modified glassy carbon electrode

i Polypyrrole/platinum nanocomposite modified glassy carbon electrode

j Graphene/pectin/copper nanoparticles modified glassy carbon electrode

k carbon supported Pt−MnO_x nanoparticles modified glassy carbon electrode

l Reversible hydrogen electrode

m Saturated calomel electrode

Table S4 Comparison of the performance of the Pt@POMs-OMC–GCE for the electrochemical detection of NB with that of other modified electrodes.

Working electrode	potential (V)	Linear range (μM)	sensitivity (μA mM^{-1})	Limit of detection (μM)	Reference
RGO–AgNPs/GCE [a]	-0.45 (Ag/AgCl)	0.5-900	59.36	0.26	23
Pd–GG–g-PAM–silica/GCE[b]	-0.6 (SCE[k])	1-3900	26	0.06	24
NPC/GCE[c]	-0.62 (Ag/AgCl)	2-100	126	0.62	25
PNMPC/Nafion/GCE[d]	-0.7 (Ag/AgCl)	1-200	6.93	0.05	26
MMPCMs/GCE[e]	-0.64 (SCE)	0.2-40	2360	0.008	27
BiF/CPE[f]	-0.65 (SCE)	1-100	289	0.83	28
OMC/DDAB/GCE[g]	-0.5 (Ag/AgCl)	20-2900	-	10	29
EAG/SPCE[h]	-0.624 (Ag/AgCl)	0.3-374.5	102.6	0.06	30
SiO_2/Au NPs/GCE[i]	-0.74 (Ag/AgCl)	0.1-25	102	0.1	31
HMDE[j]	-0.8 (Ag/AgCl)	14.7-1000	-	5	32
Pt@POMs-OMC–GCE	-0.59 (Ag/AgCl)	3.98-672.55	102.62	3.82	This work

a Silver nanoparticles decorated reduced graphene oxide modified glassy carbon electrode

b Palladium nanoparticles decorated guar gum grafted polyacrylamide polymer-silica nanocomposite modified glassy carbon electrode

c Nitrogen doped porous carbon modified glassy carbon electrode

d Pt nanoparticles ensemble on macroporous carbon hybrid nanocomposites/Nafion modified glassy carbon electrode

e Macro-/meso-porous carbon materials were modified on the surface of a glassy carbon electrode

f A bismuth-film modified carbon paste electrode

g Ordered mesoporous carbon/didodecyldimethylammonium bromide composites film coated glassy carbon electrode

h Electrochemically activated graphite modified screen printed carbon electrode

i Silica-stabilized gold nanoparticles modified glassy carbon electrode

j Hanging mercury drop electrode

k Saturated calomel electrode

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