Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting information

One-step synthesis of Au nanoparticles-graphene composite using tyrosine: Electrocatalytic and catalytic properties

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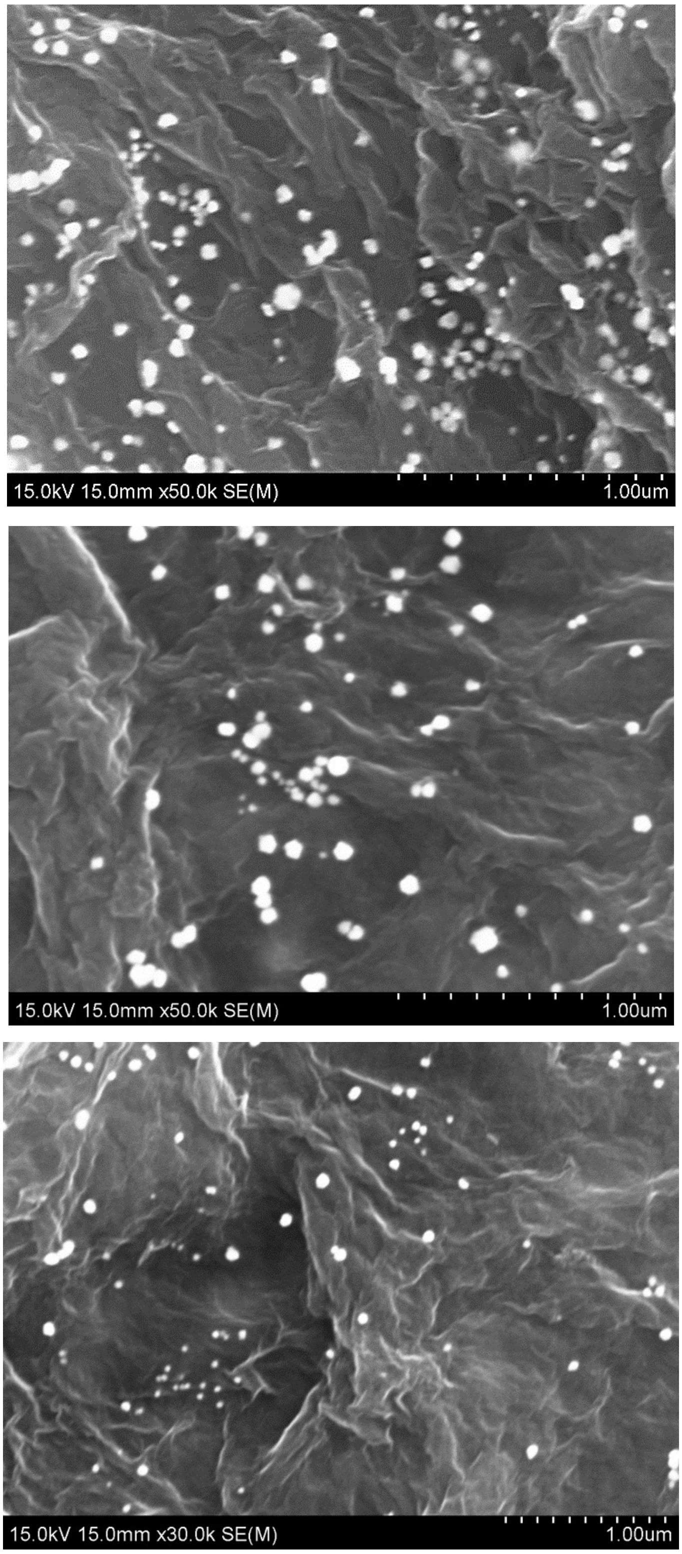
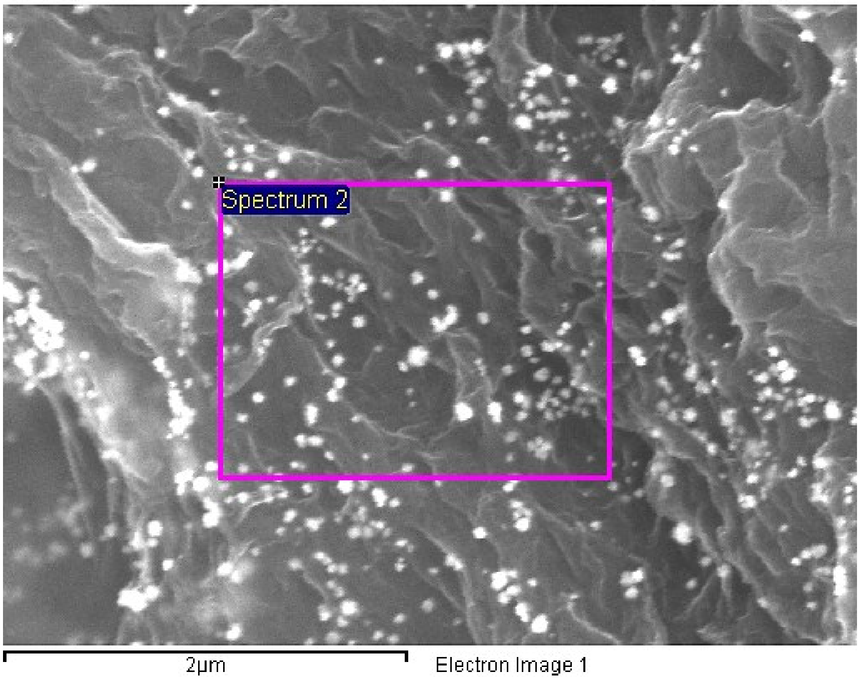
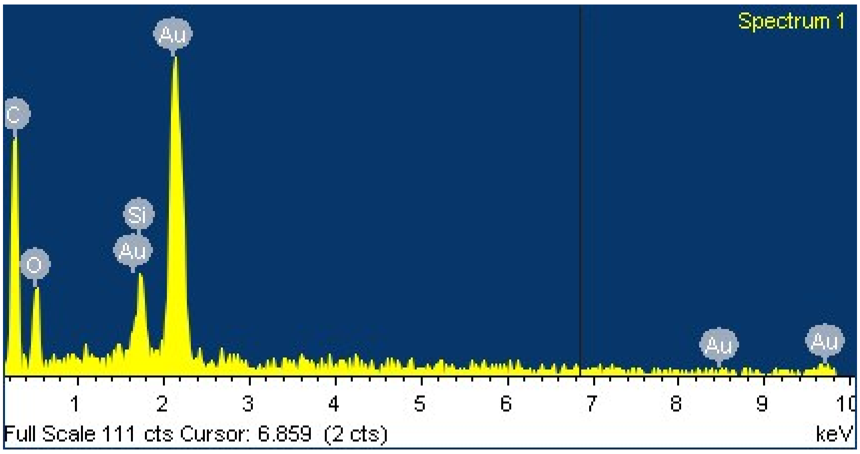


Figure S1. SEM images of the rGO/Au NPs/Tyr nanocomposite.





Element	Weight %	Atomic%
C K	38.51	73.69
O K	14.50	20.83
Au M	46.99	5.48
Totals	100.00	100.00

Figure S2. SEM and EDX analysis of rGO/Au NPs/Tyr.

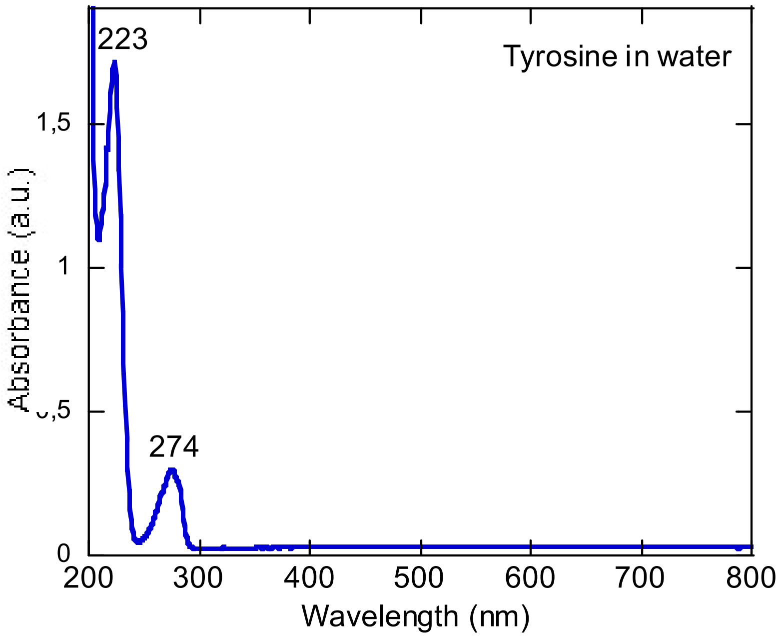


Figure S3. UV/Vis absorption spectrum of tyrosine (50 µM) in water

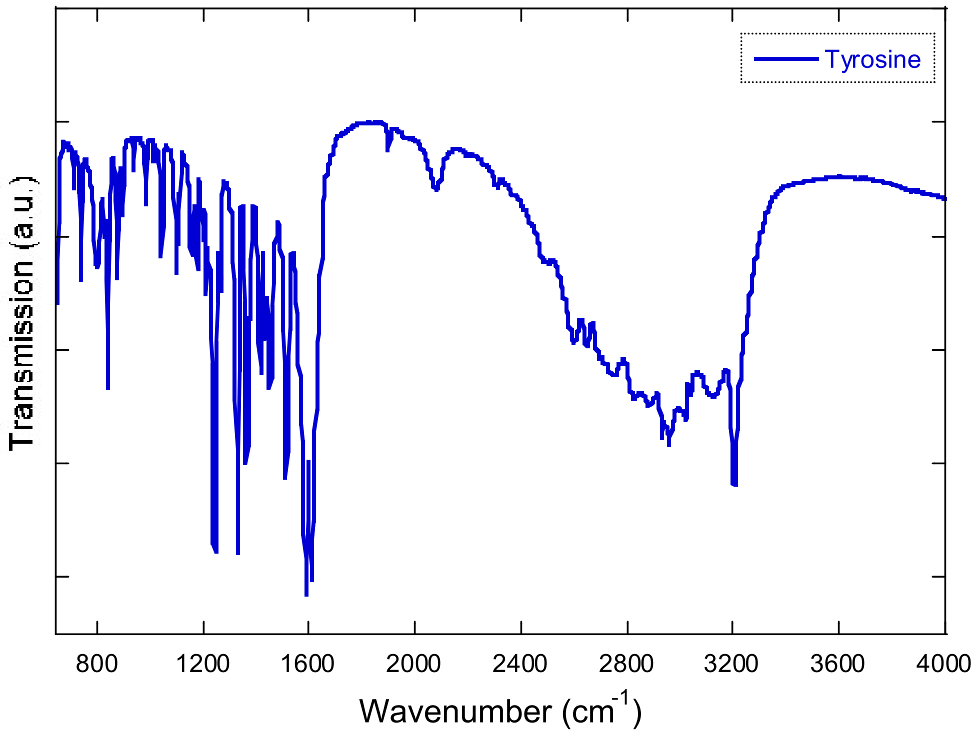


Figure S4: Transmission FTIR spectrum of tyrosine.

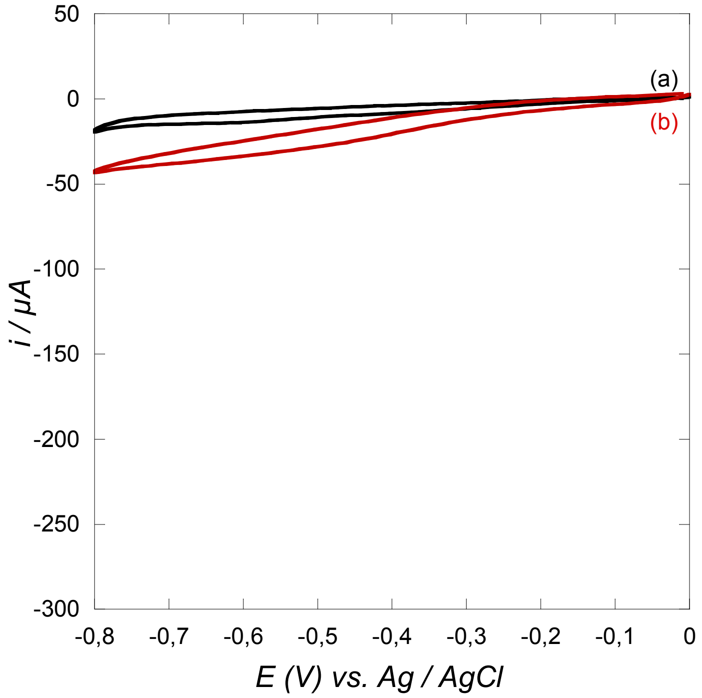


Figure S5: Cyclic voltammograms of GC electrode in N_2-saturated 0.1 M PBS solution (pH 7.4) in the absence (a) and presence (b) of 10 mM H_2O_2; scan rate: 50 mV/s.

Table S1. Comparison of analytical performance of other Au NPs/rGO-based non-enzymatic H_2O_2 sensors

Electrode	Detection limit (μM)	Sensitivity (μA mM^{-1} cm^{-2})	Linear range (mM)	Ref.
AuNPs/PDDA/rGO/GC[a]	0.44	-	0.0005-0.5	1
Au NPs/SGS/GC[b]	0.25	3.21	2.3-16	2
AuNPs/rGO paper	2	236.8	0.005-8.6	3
AuNPs/rGO/GC	6	3	0.020-0.280	4
AuNPs/POM/rGO[c]	1.54	58.87	0.005-18	5
AuNPs/EPG/FTO[d]	0.1	75.9	0.0005-4.9	6
rGO/Nafion/AzI/AuNPs/GC[e]	10	-	0.03-5	7
AuNPs/MnO_2/rGO/GC	0.05	980	0.022-12.6	8
PtAuNPs/rGO/CNTs[f]	0.6	313.4	0.002-8.561	9
AuNPs/rGO/GC membrane	6.2	5.3	0.25-22.5	10
Ag-Au-rGO/GC	1	-	0.1-5	11
Au-MWCNTs–sG@GCE[g]	13	-	1-62	12
AuNPs/rGO/GCE	1.5	-	0.1-9	13
Au NPs–Gr	0.03	-	0.0001-0.07	14
Au NPs−N-GQDs[h]	0.12	186.22	0.00025-13.327	15

rGO: reduced graphene oxide

Au NPs: gold nanoparticles

[a]PDDA: poly(diallyldimethyl ammonium chloride)

[b]SGS: sulfonated graphene sheets

[c]POM: polyoxometalate

[d]EPG: embedded porous graphene

[e]AzI: Azur I

[f]CNTs: carbon nanotubes

[g]MWCNTs–sG: Au nanoparticles-decorated multiwalled carbon nanotube-solar exfoliated graphene

[h]Au NPs−N-GQDs:Au nanoparticles (Au NPs) on nitrogen-doped graphene quantum dots

Table S2. Comparison of catalytic performance of Au NPs/rGO-based catalysts for the reduction of nitrophenol

Catalyst	Rate constant	Reference
Au nanoparticles/GO Au nanoplates/GO	$18.8 x10^{-2} min^{-1}$ $4.67 x 10^{-2} min^{-1}$	16
Au/rGO hybrid nanostructures	$0.309 min^{-1}$	17
GO-Fe_3O_4/Au NPs	$3.22 x 10^{-2} s^{-1}$	18
Au-PRGO	$8.77 x 10^{-3} s^{-1}$	19
rGO-Au hybrid film	$3.33 s^{-1} g^{-1}$	20
Au-Ag/GO	$3 x 10^3 s^{-1} g^{-1}$	21
GO/SiO_2/Au NPs	$1.04 min^{-1}$	22
AuNPs/TWEEN/GO	$25.37 x 10^{-2} min^{-1}$	23
AuNP/PQ11/GN	$30.58 x 10^{-2} min^{-1}$	24
Au/GO	$0.368 min^{-1}$	25
Au/graphene hydrogel	$31.7 s^{-1} g^{-1}$	26
Au/SRG	$60 h^{-1}$	27
graphene/PDA–Au	$0.12-0.225 min^{-1}$	28
GO-N/Au	$0.11-.015 min^{-1}$	29
Au/TP-GS	$0.939 \times 10^{-2} s^{-1}$	30
Au/PDIL-GS	$6.72\times10^{-3} s^{-1}$	31
Au-NPs@NH_2/GNS-PO_3H_2 composite	$0.325 min^{-1}$	32
bio-AuNPs/rGO	$138.45 s^{-1} M^{-1}$	33
Au@HGN	$1.12 min^{-1}$	34

Au-PRGO: Au nanoparticles-partially reduced graphene oxide
GN: graphene nanosheets
PQ11: poly [(2-ethyldimethylammonioethyl methacrylate ethyl sulfate)-co-(1-vinylpyrrolidone)]
Au/SRG: Au decorated thiol-functionalized reduced graphene oxide
PDA: polydopamine
Au/TP-GS: Au nanoparticles anchored to thiophenol covalently functionalized graphene sheets
Au/PDIL-GS: Ionic liquid of 3,4,9,10-perylenetetracarboxylic acid-noncovalent functionalized graphene
Au-NP@NH_2: amine-functionalized Au-NP
GNS-PO_3H_2: phosphonate-functionalized graphene nanosheets
HGN: hollow graphene nanoshell

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