

Electrochemical fabrication of gold nanoparticles decorated on activated fullerene C60; An enhanced sensing platform for trace level detection of toxic hydrazine in water samples

Selvakumar Palanisamy, Balamurugan Thirumalraj, Shen-Ming Chen*

Electroanalysis and Bioelectrochemistry Lab, Department of Chemical Engineering and Biotechnology, National Taipei University of Technology, No. 1, Section 3, Chung-Hsiao East Road, Taipei 106, Taiwan, ROC.

*E-mail: smchen78@ms15.hinet.net; Fax: +886-2-27025238; Tel: +886-2-27017147.

Supporting information

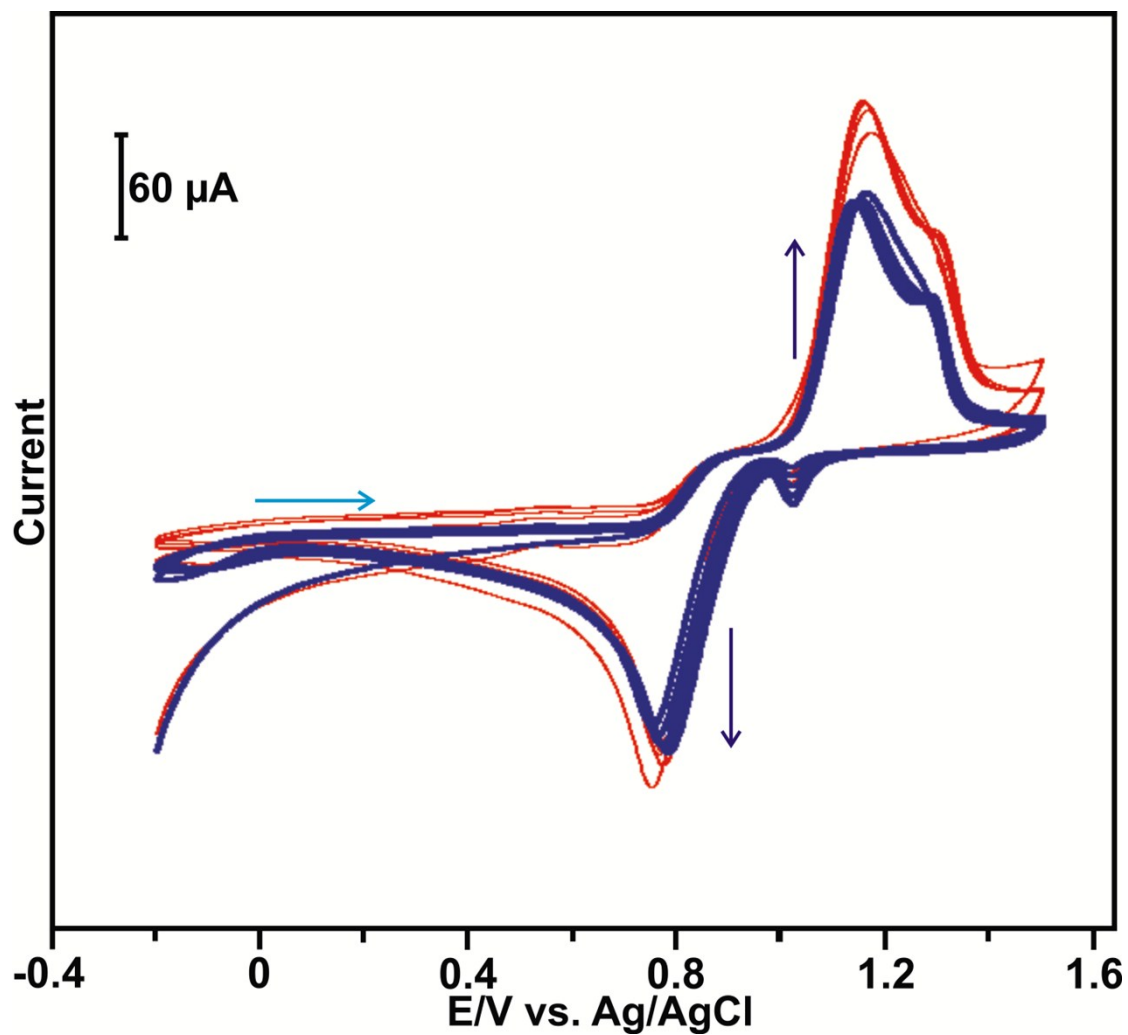


Fig. S1 Electrochemical deposition of AuNPs on AC60 (red line) and C60 (blue line) modified SPCEs by 5 consecutive cyclic voltammograms in the electrochemical cell containing 1.3 mM $\text{K}(\text{AuCl}_4) \cdot 3\text{H}_2\text{O} + 0.5 \text{ M } \text{H}_2\text{SO}_4$ at the scan rate of 50 mV s^{-1} .

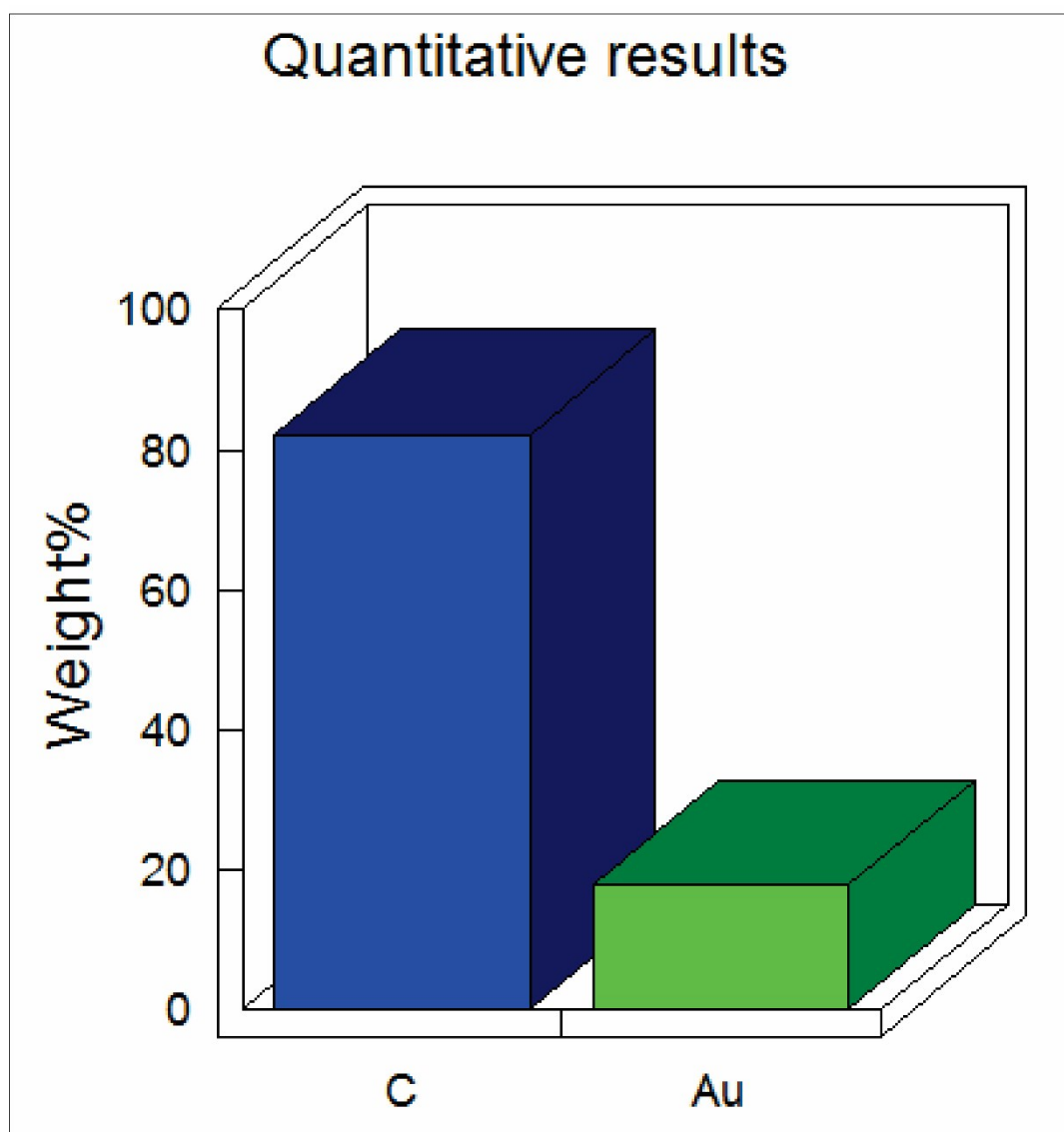


Fig. S2 Quantitative results of EDX profile for AC60-AuNPs modified SPCE.

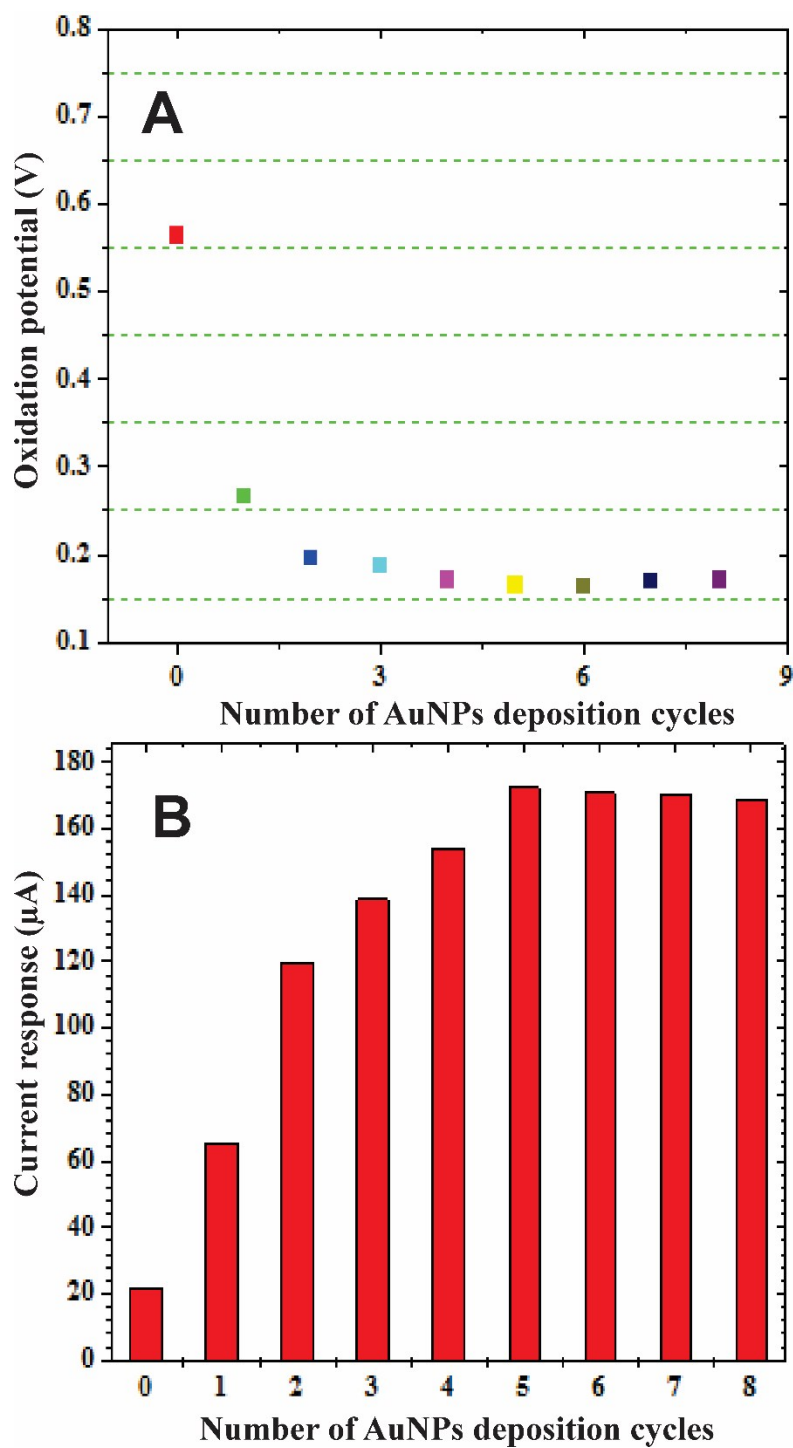


Fig. S3 Optimization of AuNPs electrodeposition on AC60 modified SPCE; Different AuNPs deposition cycle vs. peak potential (A) and peak current response (B) for 1 mM hydrazine in N_2 saturated PBS at a scan rate of 50 mV s^{-1} .

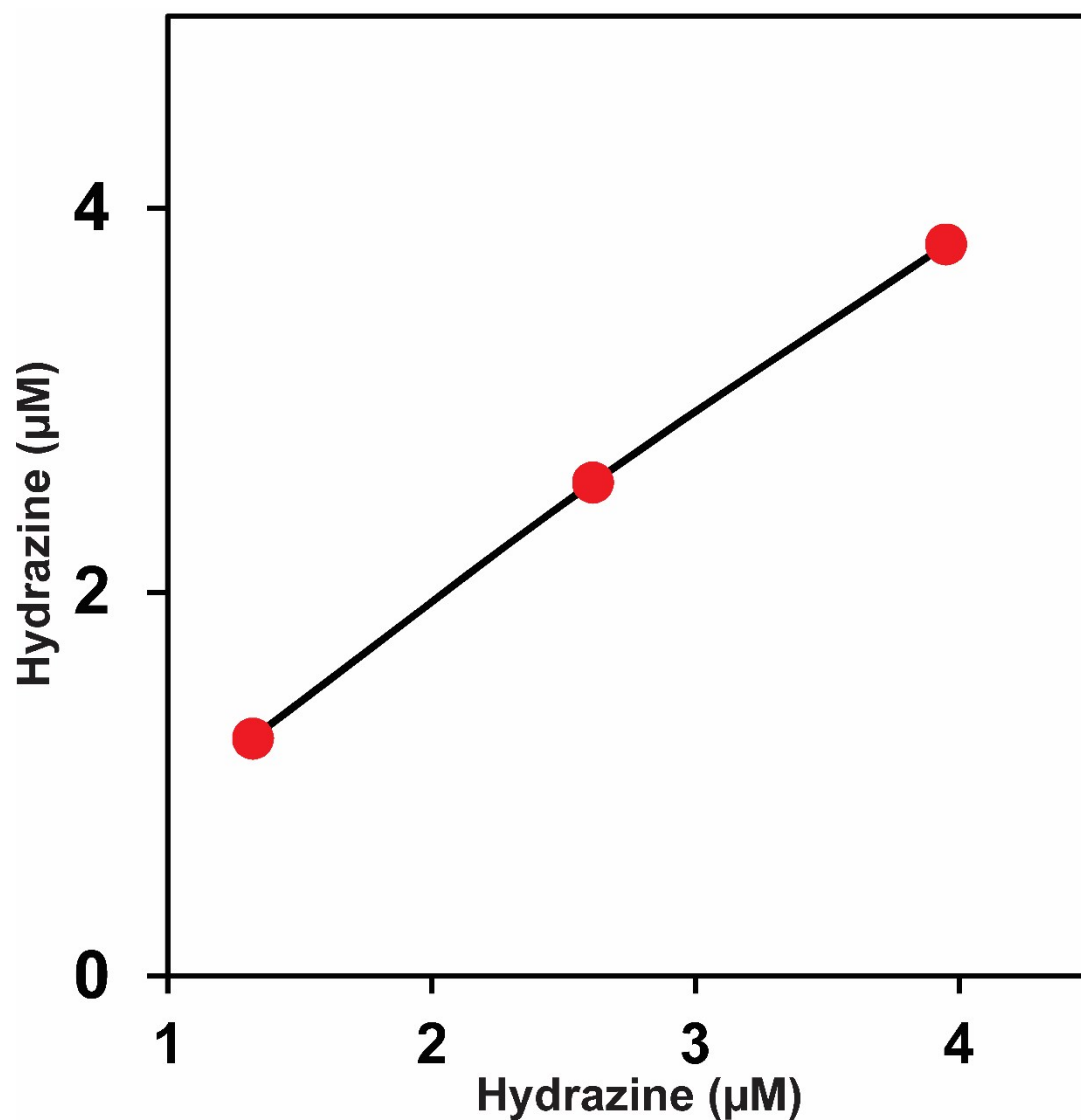


Fig. S4 Correlation between the results obtained for the detection of hydrazine by AC60-AuNPs modified electrode and HPLC method. *x* axis: hydrazine electrochemical sensor (AC60-AuNPs modified electrode); *y* axis: HPLC method.

Table ST1 Comparison of analytical performance (sensitivity, LOD and LCR) of AC60–AuNPs

Modified electrode	Method	Sensitivity ($\mu\text{A}\mu\text{M}^{-1}\text{ cm}^{-2}$)	LOD (μM)	LCR (μM)	Ref.
AuCu ₃ /AuBPE	FIA	0.164	0.04	up to 1000	1
(Au-SH-SiO ₂ @Cu-MOF)/GCE	DPV	0.1	0.01	up to 1000	2
AuNPs/GPE	Amp.	–	3.07	up to 1000	3
GR/Pectin AuNPs/GCE	Amp.	1.786	0.0016	up to 197.4	4
AG/AuNPs/SPCE	Amp.	0.54	0.00057	up to 936	5
AuNPs/choline/GCE	LSV	0.0843	0.1	up to 500	6
ZnO/Nf/AuE	Amp.	0.015	0.25	up to 200	7
γ -Fe ₂ O ₃ /Au/GCE	Amp.	0.060	0.006	up to 11	8
Au/ZnO-MWCNT/GCE	Amp.	0.0428	0.15	up to 1800	9
AuNPs/TWEEN/GO/GCE	Amp.	NA	0.078	up to 0.003	10
AC60–AuNPs/SPCE	Amp.	0.583	0.039	up to 1210	This work

modified SPCE with previously reported AuNPs based hydrazine sensors.

Abbreviations;

LOD – limit of detection, LCR – linear concentration range, AuBPE – barrel-plated gold electrode, FIA – flow injection analysis, (Au-SH-SiO₂@Cu-MOF) – Metal-organic frameworks, GCE – glassy carbon electrode, DPV – differential pulse voltammetry, AuNPs – gold nanoparticles, GPE – graphite paste electrode, GR – graphene, AG – activated graphite, SPCE – screen printed carbon electrode, LSV – linear sweep voltammetry, ZnO – zinc oxide, Nf – nafion, AuE – gold electrode, γ -Fe₂O₃ – iron oxide nanoparticles, Au – nano gold, MWCNT – multiwalled carbon nanotubes, GO – graphene oxide.

References

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