Supporting Information

for

Electrochemical detection of gallic acid-capped gold nanoparticles using multi-walled carbon nanotube-reduced graphene oxide nanocomposite electrode

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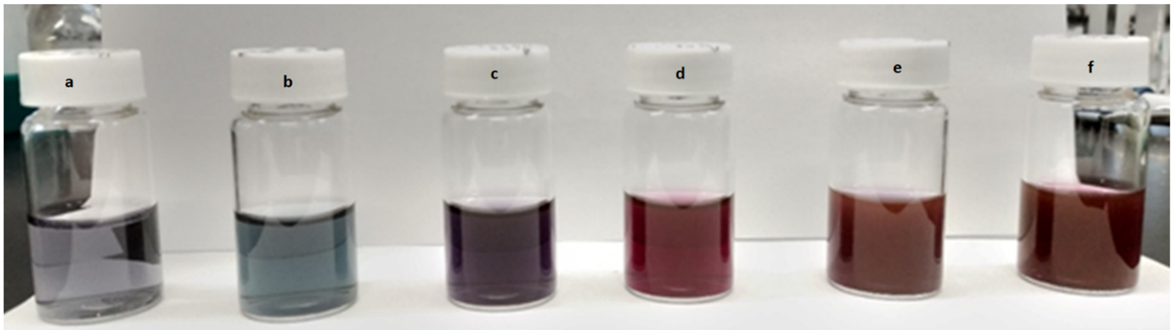

Figure S1 – Photograph showing the colloidal solutions of GA-AuNPs synthesized using varying concentrations of $HAuCl_4.3H_2O$ (samples a-f), a) 167 µM b) 250 µM c) 333 µM d) 375 µM e) 500 µM f) 537 µM during reduction reaction with GA. Colloidal solutions in various colours were obtained depending on the size of the GA-AuNPs produced during the synthesis reaction.

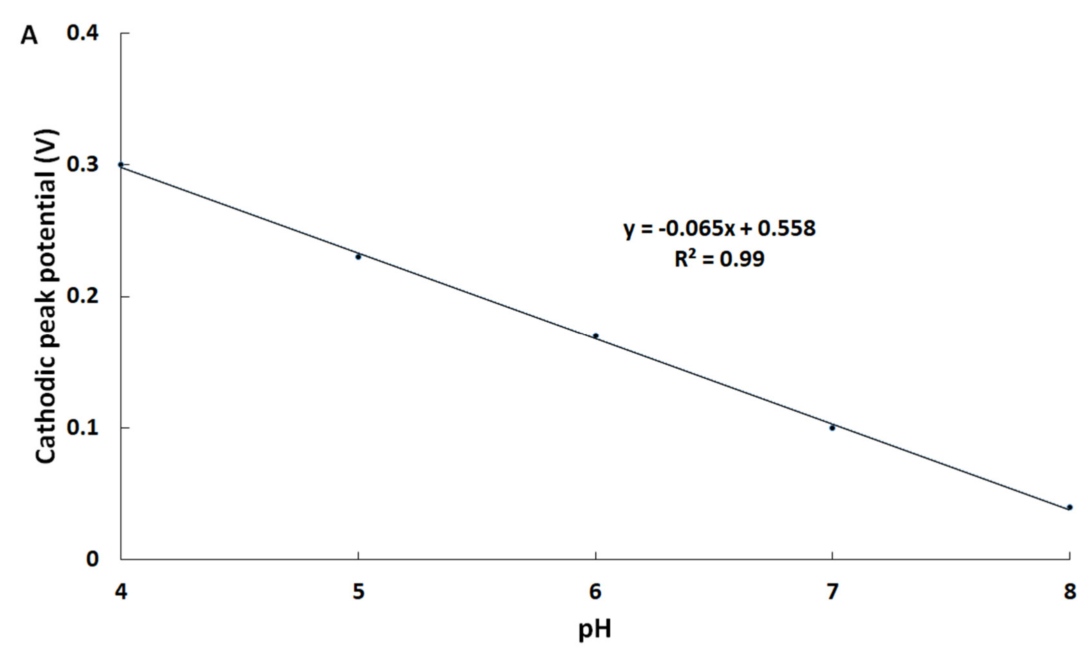

Figure S2A. Plot of cathodic peak potential vs pH for the detection of GA-AuNPs (85 pM) at MWCNT-rGO-GCE. DPV measurements were performed in 0.1 M PBS at an amplitude of 25 mV and a step potential of 5 mV.

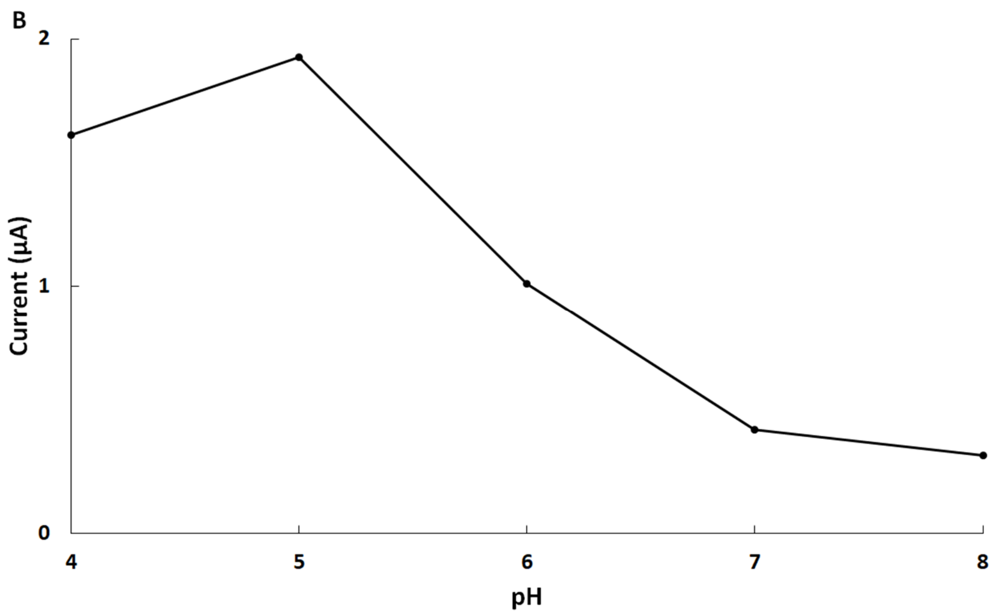

Figure S2B. Plot of cathodic peak current vs pH for the detection of GA-AuNPs (85 pM) at MWCNT-rGO-GCE. DPV measurements were performed in 0.1 M PBS at an amplitude of 25 mV and a step potential of 5 mV.

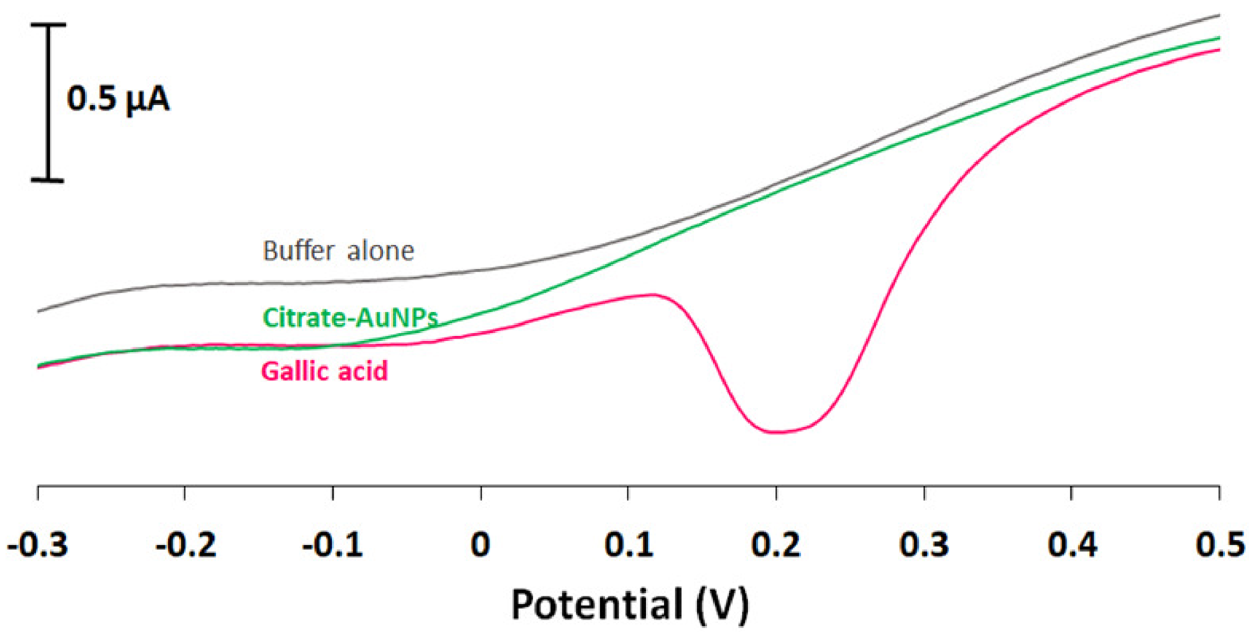

Figure S3A. Differential pulse voltammograms of 85 pM of citrate-AuNPs (green trace) and 300 µM gallic acid (pink trace) at bare GCE. DPV measurements were performed in 0.1 M PBS (pH 5) at an amplitude of 25 mV and a step potential of 5 mV from 0.5 V to -0.3 V (vs. Ag/AgCl).

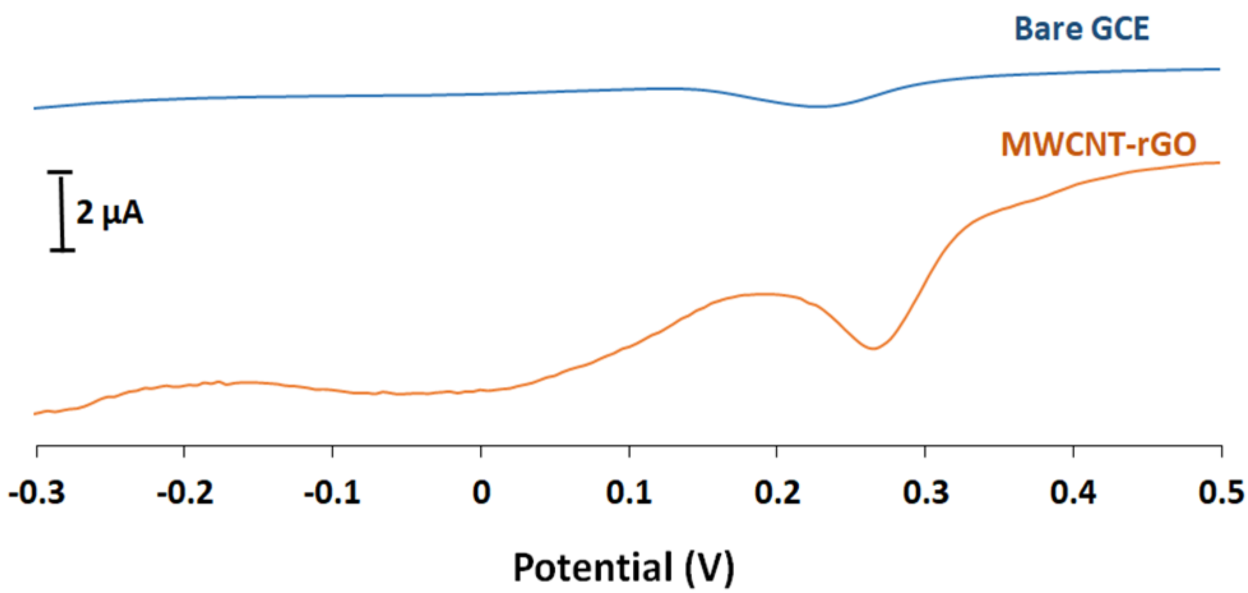

Figure S3B. Differential pulse voltammograms of 85 pM GA-AuNPs at bare GCE (blue) and MWCNT-rGO modified GCE (orange). DPV measurements were performed in 0.1 M PBS (pH 5) at an amplitude of 25 mV and a step potential of 5 mV from 0.5 V to -0.3 V (vs. Ag/AgCl).

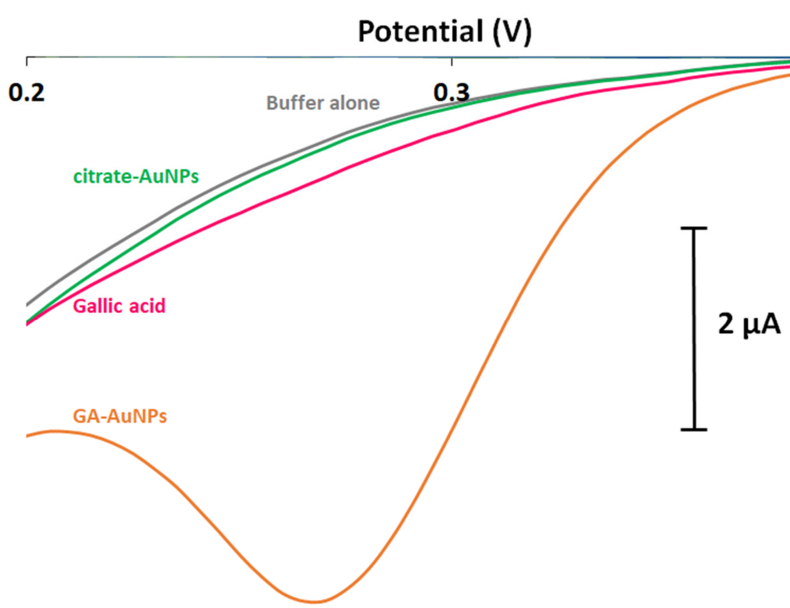

Figure S4. Differential pulse voltammograms of 85 pM GA-AuNPs (orange trace), 85 nM gallic acid (pink trace) and 85 pM citrate-AuNPs (green trace) at MWCNT-rGO modified GCE. DPV Measurements were carried out in 0.1 M PBS (pH 5) at an amplitude of 25 mV and a step potential of 5 mV from 0.4 V to 0.2 V (vs. Ag/AgCl).

Table S1. Equivalent circuit elements following fitting of EIS data obtained from bare GCEs and modified electrodes as shown in Fig. 5.

	R_s (Ω)	R1 (Ω)	R2 (Ω)	Q_{dl} (μMho*s^N)	N	Q1 (μMho*s^N)	N	Q2 (μMho*s^N)	N
Bare GCE	158	573	n.d.	10.5	0.696	42.7	0.407	n.d.	n.d.
rGO	119	24600	1720	8.16	0.705	635	1	60.5	0.784
MWCNT	121	10800	2550	5.36	0.782	28.9	0.539	9.09	1.03
MWCNT +rGO	108	51.8	n.d.	111	0.921	130	0.692	n.d.	n.d.

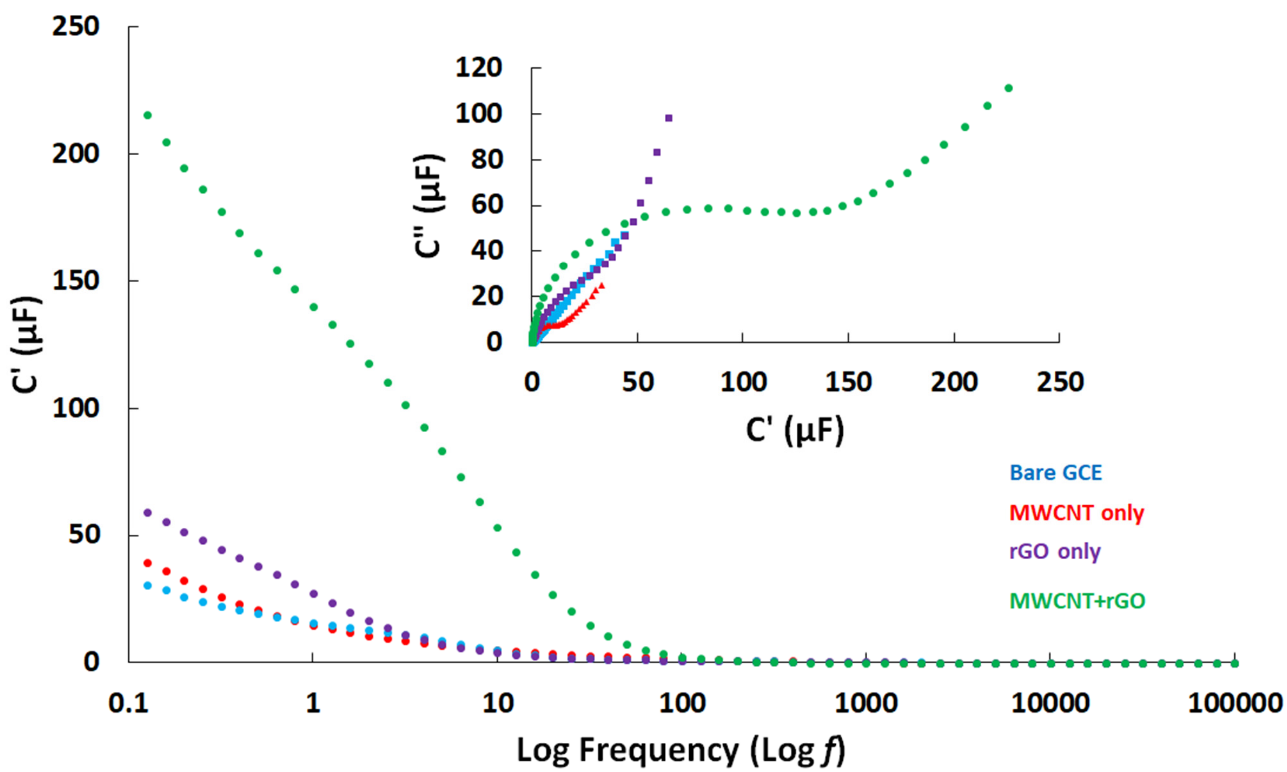

Figure S5. Bode-Bode plots of A) Bare GCE, B) rGO-modified GCE, C) MWCNT-modified GCE and D) MWCNT-rGO-modified GCE. Inset shows the plot of C' vs C" for each of the electrode modifications. Equivalent circuits for each electrode modification are provided in Figure. 5 in the main text.

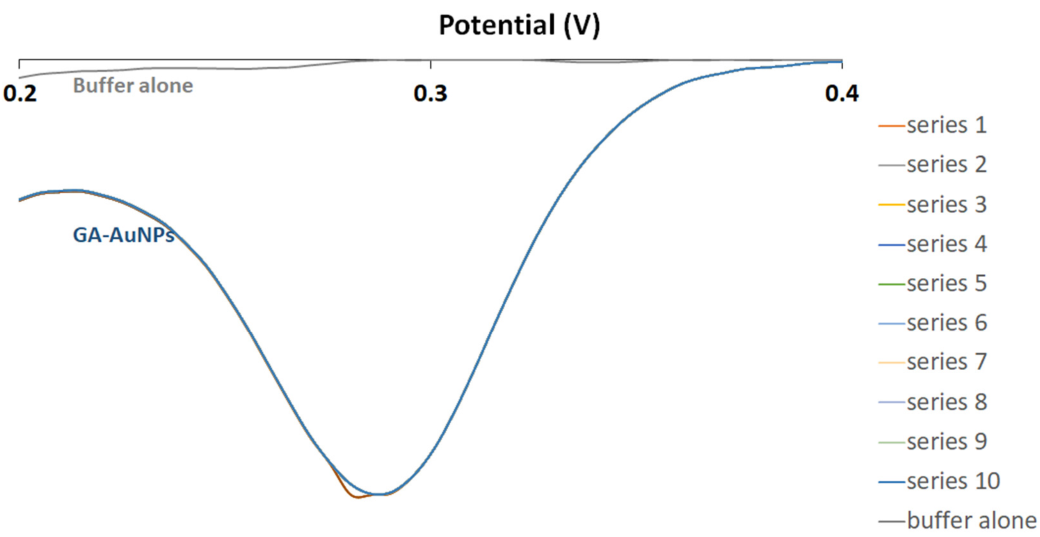

Figure S6. Differential pulse voltammograms of MWCNT-rGO-modified GCEs in 0.1 M PBS (pH 5) for repetitive measurements (n = 10) of a solution containing 164 pM GA-AuNPs.