

Supplementary information for:

Graphene-multiwalled carbon nanotube hybrids synthesized by gamma radiations: Application as a glucose sensor

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Fig. S1

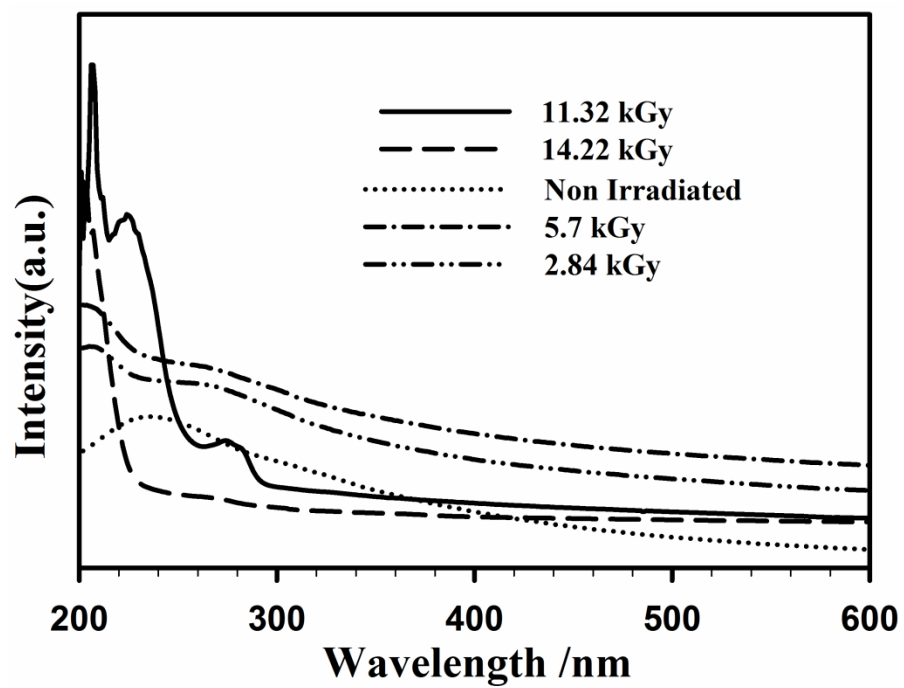


Fig S1. UV-Vis spectra of unirradiated and irradiated GO +MWCNTs obtained in water-ethanol

solutions for different gamma doses.

Fig . S2

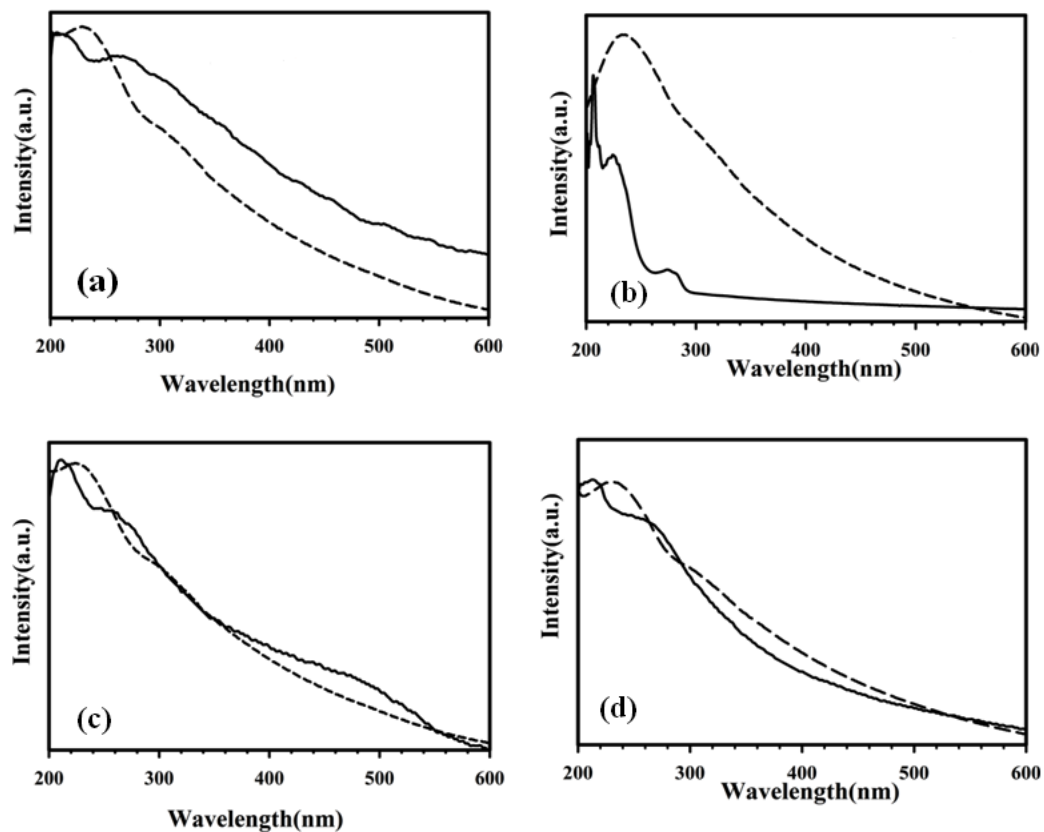


Fig . S2 UV-Vis spectra obtained before (dashed line) and after (solid line) γ irradiation of 1:1

(V/V) water-alcohol solvent mixtures: methanol (a) ethanol (b) isopropanol (c) and *tert*-butanol).

Fig. S 3

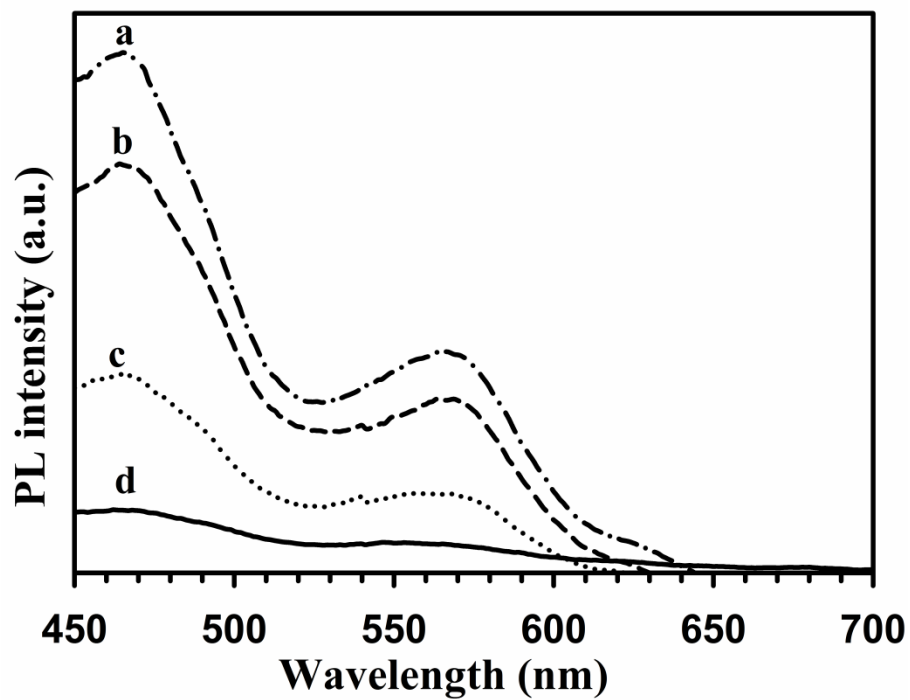


Fig. S3 PL spectrum of G-MWCNTs after γ irradiation using 1:1 water-alcohol solvent mixtures

tert-butanol (a), iso-propanol (b), methanol (c) and ethanol (d).

Fig. S4

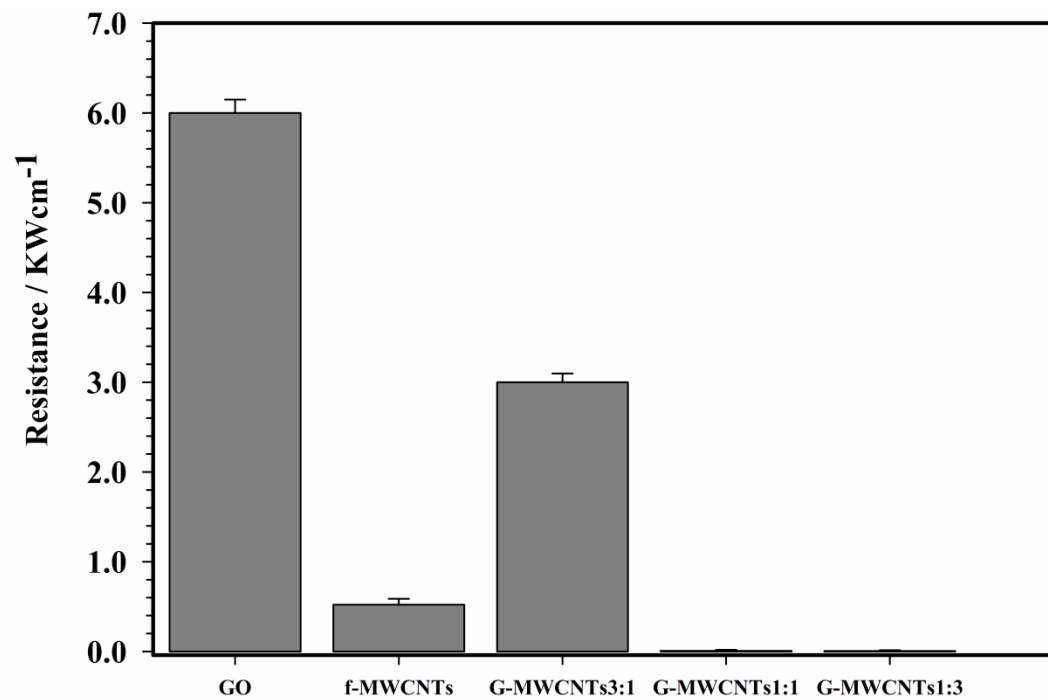


Fig. S4 Comparison between the resistances of GO, f-MWCNTs, G-MWCNTs (3:1), G-MWCNTs (1:1) and G-MWCNTs (1:3).

Fig. S5

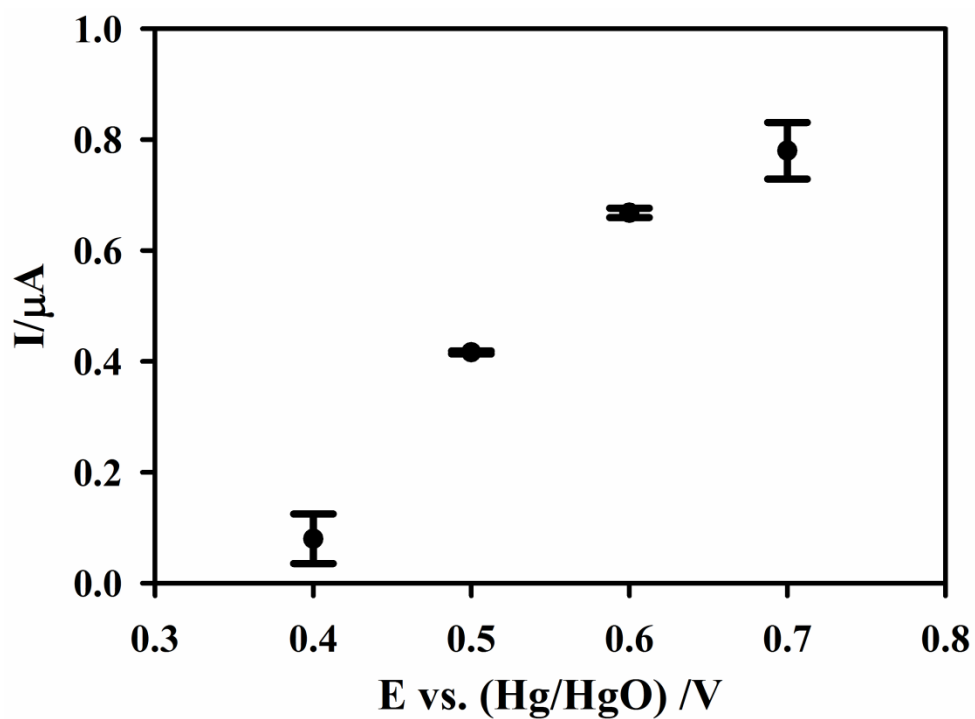


Fig. S5 Amperometric responses of G-MWCNTs modified electrodes at various applied potentials (+0.4 to +0.7 V) in presence of 2mM glucose solution. Error bars show variation in result for four amperometric experiments at each potential.

Fig. S6

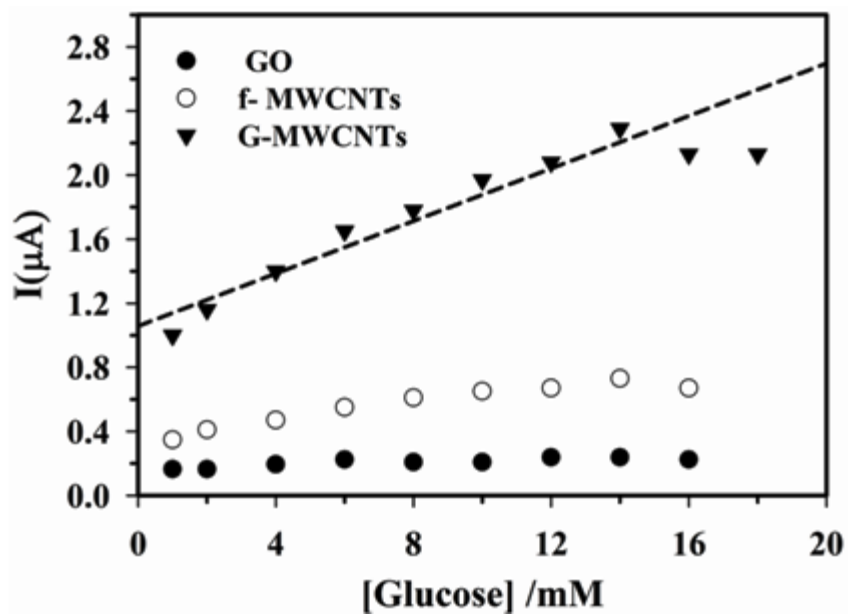


Fig.S6. Calibration curves obtained from amperometric response for glucose sensing at (from bottom to top) GO, f-MWCNTs and G-MWCNTs modified electrodes.

S.7 Linear equation

The linear regression equation can be expressed as:

$$I_p (\mu A) = 0.1[\text{glucose}] (\mu A m M^{-1}) + 1(\mu A)$$

$$R^2 = 0.985$$

S7.1. Calculation for the sensitivity and detection limit of amperometric glucose sensor based on rGO-MWCNTs modified electrode for data presented in Fig 8b.

From Figure 8b, a plot of limiting current vs. glucose concentration (mM) is fitted into the linear regression, $y = (1.0 \times 10^{-7})x + (1.0 \times 10^{-6})$ from the slope; sensitivity is computed from the relation,

$$\text{Sensitivity} = \frac{\Delta i}{\Delta C} = \text{slope}$$

$$\text{Sensitivity} = 12.5 \mu A \cdot m M^{-1} cm^{-2}$$

S.7.2. Detection limits (DL)

$$DL = \frac{K \cdot S_b}{m}$$

S_b = Standard deviation of blank measurements (0.1M NaOH) for four repetitions.

m = Sensitivity

K value of 3 corresponds to 98% confidence level.

$$DL = \frac{3 \times 6.08 \cdot 10^{-9}}{1.25 \times 10^{-5}} = 1.45 \eta M$$

Fig. S8

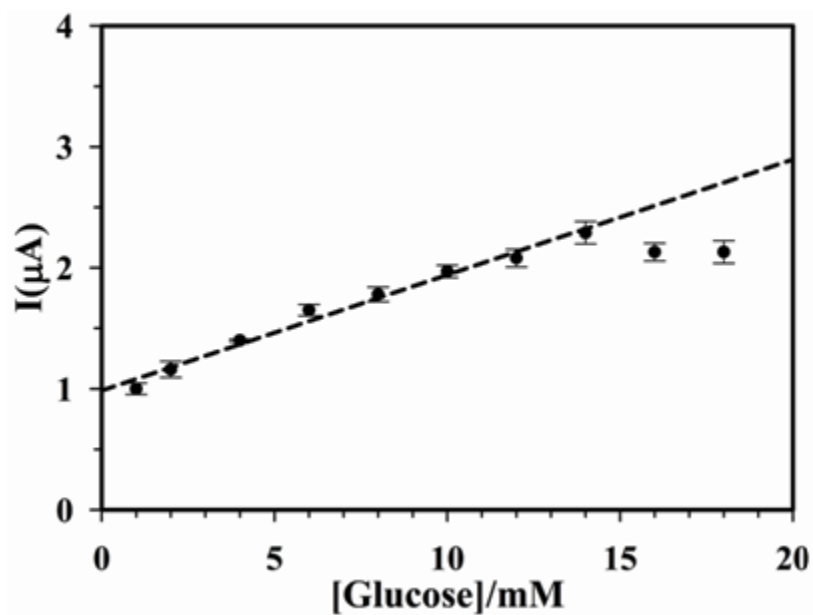


Fig. S8 Calibration curve of G-MWCNTs modified electrode with error bars obtained for four successive amperometric measurements of glucose under similar conditions.

S.9 Relative standard deviations (RSD) for four successive amperometric measurements of glucose with G-MWCNTs modified electrode.

Glucose concentration (mM)	1	2	4	6	8	10	12	14	16	18
Relative standard deviation (RSD %)	4.7 1	5.78	0.7	2.85	3.42	2.59	3.51	4.07	3.43	4.38

Fig. S10

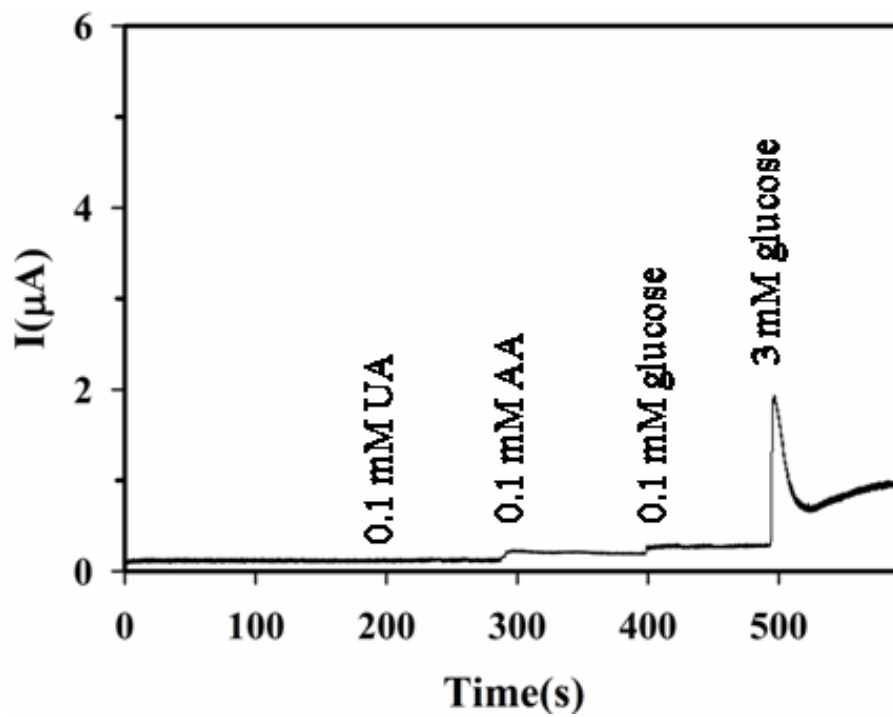


Fig. S10 The amperometric response of G-MWCNTs modified electrode to the 0.1 mM AA, 0.1 mM UA (interferences), 0.1 and 3 mM glucose.

Fig. S11

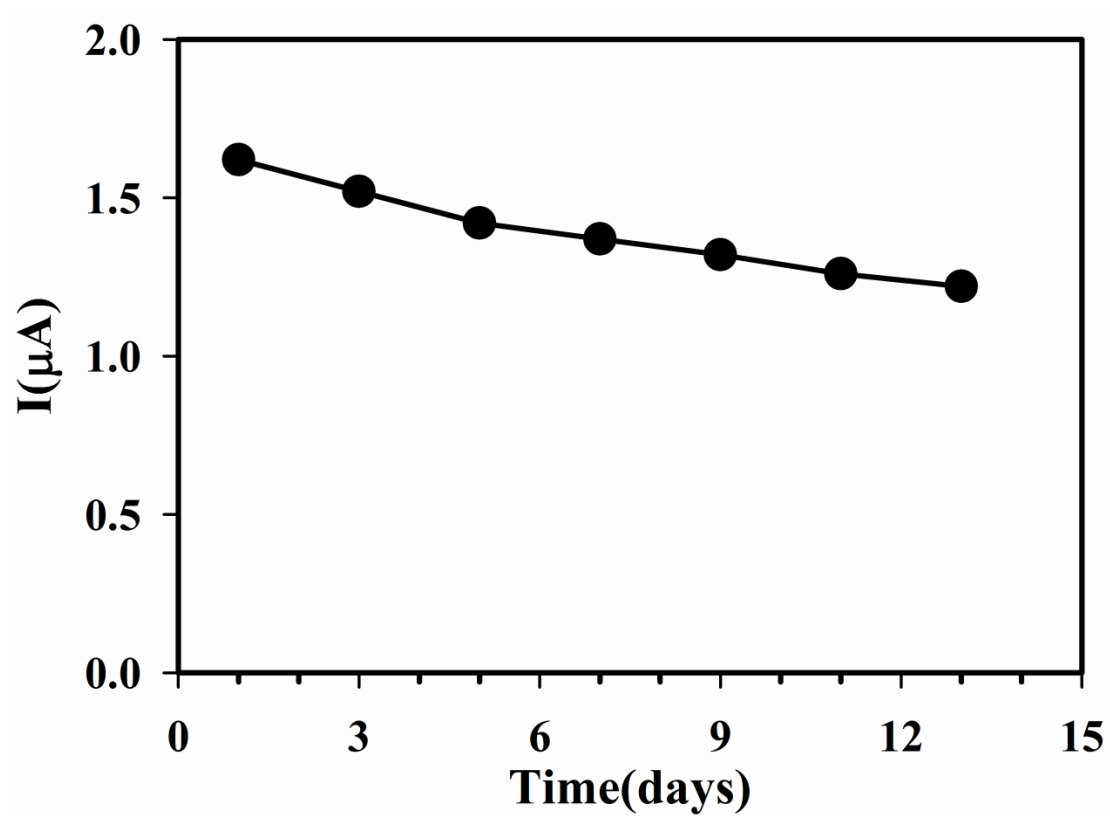


Fig. S11 Amperometric response current of G-MWCNTs modified electrode as a function of time measured at +0.6 V for 3 mM glucose concentration.