Supplementary Information (SI) for Sensors & Diagnostics.

Supporting Information:

In-Situ Electrode Interface Reaction-Enabled Electrochemiluminescence Imaging for Single-Cell Formaldehyde Release

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Characterization of GO and rGO

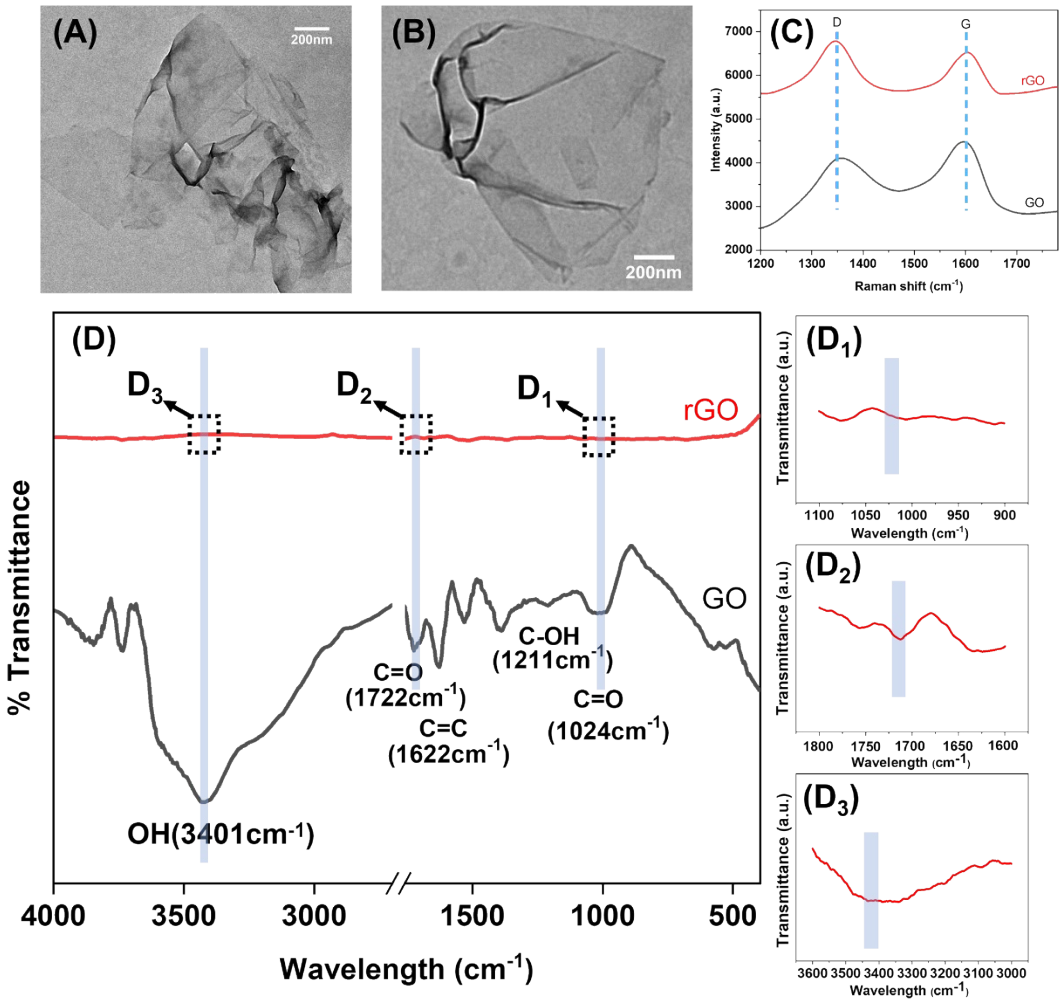

Figure S1 (A) TEM image of GO. (B) TEM image of rGO. (C) Raman spectra of bare GO (black line), rGO (red line). (D) FTIR spectra of GO (black line), rGO (red line), (D_1)-(D_3) are magnified images of the areas boxed in red line.

Electrochemical characterization of PAMAM/rGO/ITO

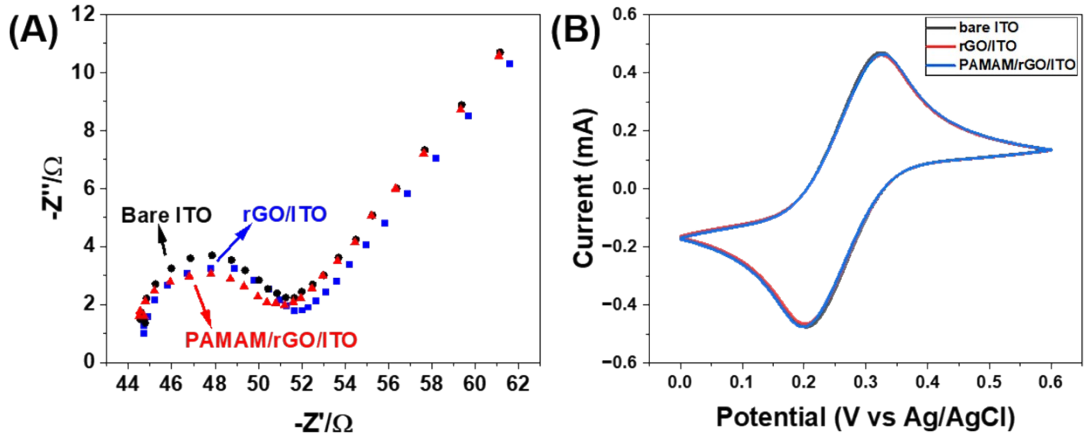

Figure S2 (A) EIS recorded using bare ITO (black line), rGO/ITO (red line) and PAMAM/rGO/ITO (blue line) in 5 mM of $[Fe(CN)_6]^{3-/4-}$ in 0.1 M KCl. (B) CV curves recorded using bare ITO (black line), rGO/ITO (red line) and PAMAM/rGO/ITO (blue line) in 5 mM of $[Fe(CN)_6]^{3-/4-}$ in 0.1 M KCl at the scan rate of 50 mV s^{-1}.

ECL curves during chronoamperometry

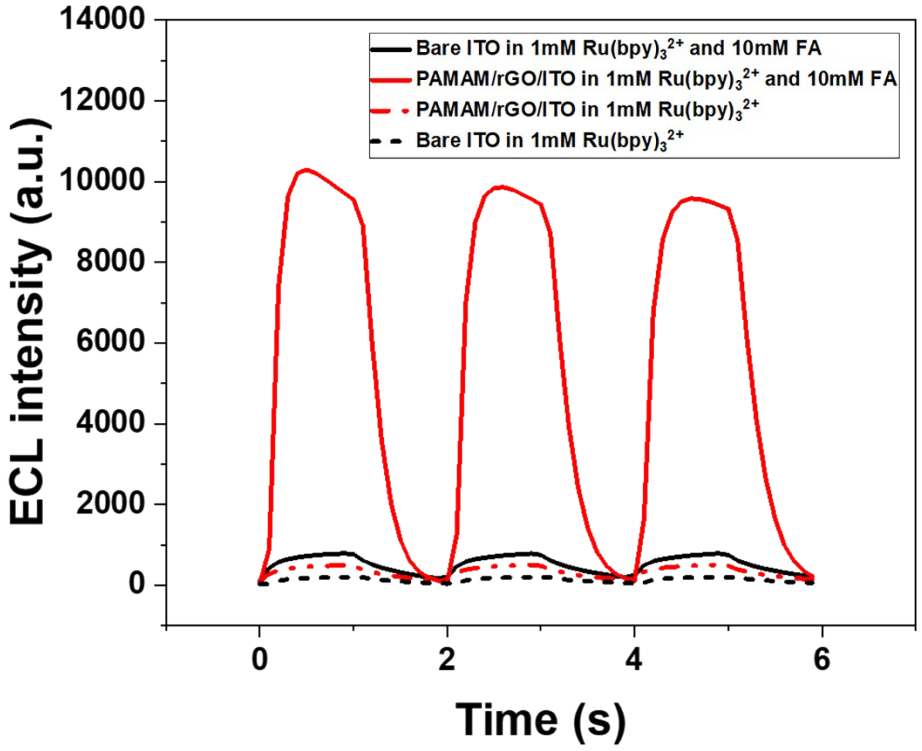

Figure S3 ECL curves at PAMAM/rGO/ITO (red line), and bare ITO (black line) in 1mM $Ru(bpy)_3^{2+}$ with or without 10mM FA respectively. The electrochemical method is the chronoamperometry (1.3V 1s, 0V 1s).

ECL curves of bare ITO and rGO/ITO

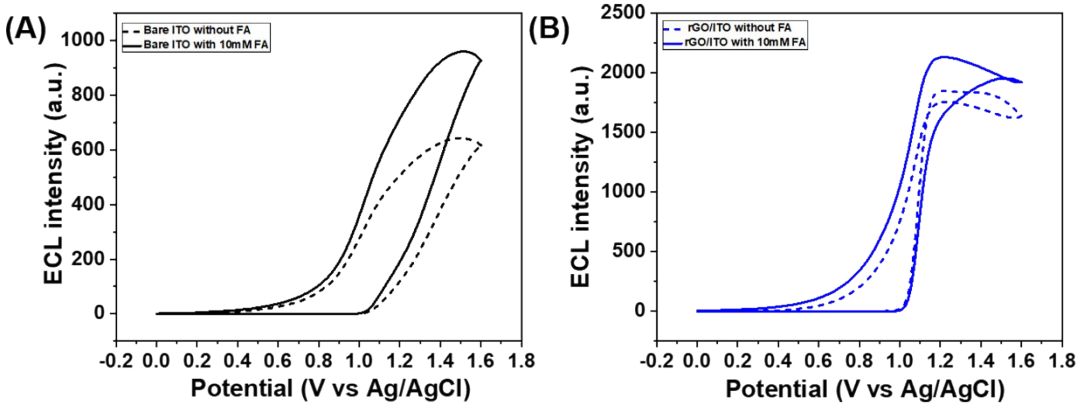

Figure S4 (A) ECL curves at bare ITO in 1mM $Ru(bpy)_3^{2+}$ with or without 10mM FA respectively. (B) ECL curves at rGO/ITO (blue line) in 1mM $Ru(bpy)_3^{2+}$ with or without 10mM FA respectively. The electrochemical method is CV.

Optimization of Modification Concentrations of rGO and PAMAM

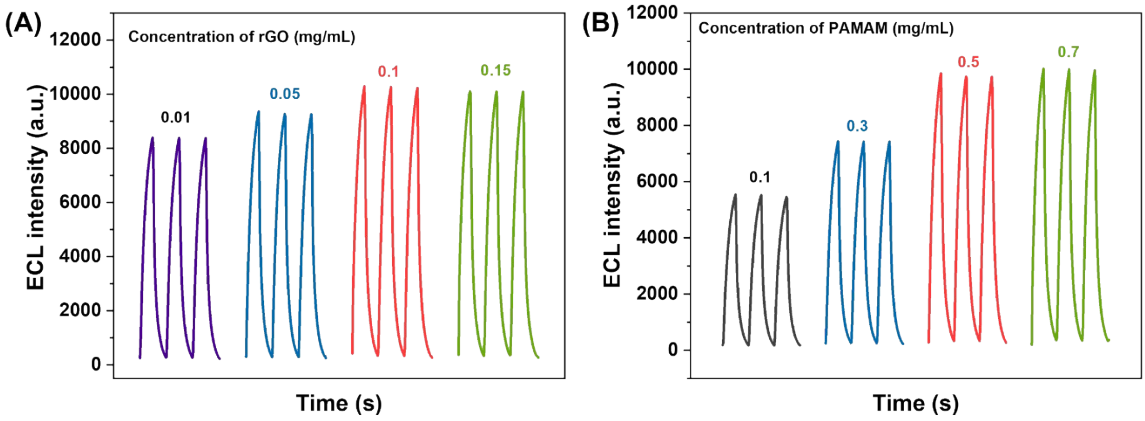

Figure S5 (A) ECL signal of ITO modified with different concentration of rGO, while the concentration of PAMAM set as 0.5mg/mL. (B) ECL signal of ITO modified with different concentration of PAMAM, while the concentration of rGO set as 0.1mg/mL. The electrochemical method is the chronoamperometry (1.3V 1s, 0V 1s). The electrolyte is 1mM $Ru(bpy)_3^{2+}$ and 10mM FA.

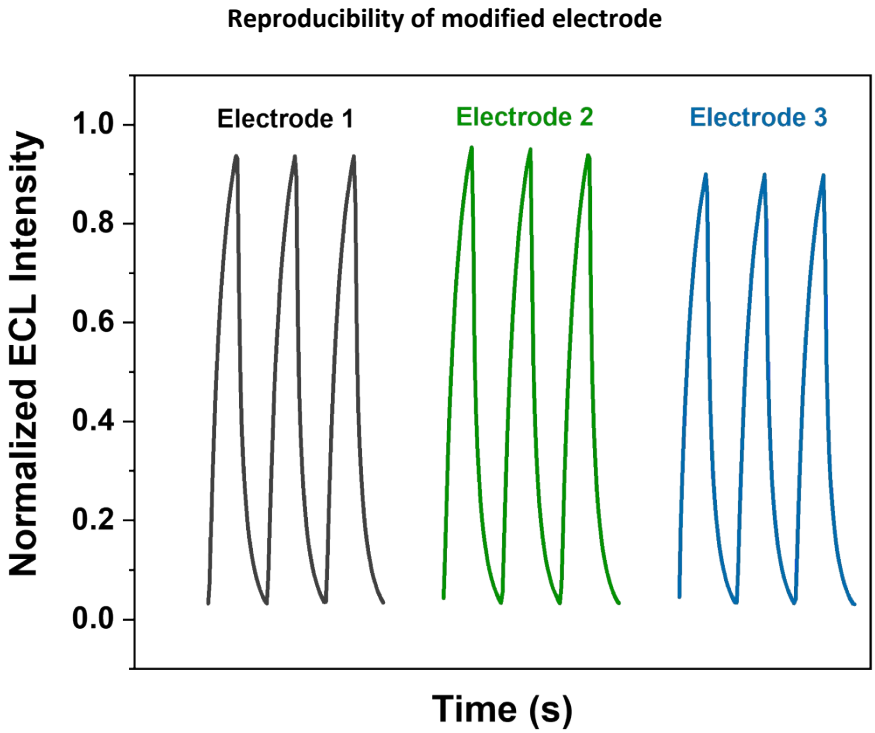

Figure S6 ECL signal from three modified electrode in 1mM $Ru(bpy)_3^{2+}$ with 10mM FA. The electrochemical method is the chronoamperometry (1.3V 1s, 0V 1s).

Detection performance in diluted serum

Amount (mM)	Found (mM)	Recovery (%)	RSD (%)
0.05	0.047	94	3.42
0.1	0.095	95	4.27
0.5	0.508	101	4.49

Table S1 Average calculated concentrations and recoveries in 0.1% serum samples. (n=3)

Control experiment on the cells without TG stimulation

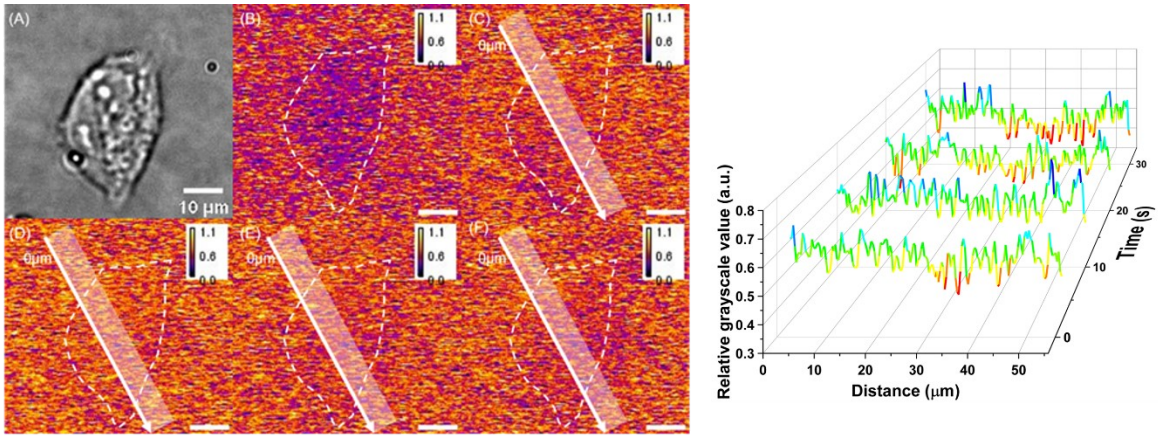

Figure S7 (A) BF image of HeLa cells on PAMAM-rGO/ITO. (B) ECL image of cells/ PAMAM-rGO/ITO in 1mM $Ru(bpy)_3^{2+}$ before stimulation. (C) The result of ECL image collected at the 2nd after the stimulation of DMSO in 1mM $Ru(bpy)_3^{2+}$ on cells/PAMAM-rGO/ITO subtract Figure B. (D) The result of ECL image collected at the 10th minute after the stimulation of DMSO in 1mM $Ru(bpy)_3^{2+}$ on cells/PAMAM-rGO/ITO subtract Figure B. (E) The result of ECL image collected at the 20th minute after the stimulation of DMSO in 1mM $Ru(bpy)_3^{2+}$ on cells/PAMAM-rGO/ITO subtract Figure B. (F) The result of ECL image collected at the 30th minute after the stimulation of DMSO in 1mM $Ru(bpy)_3^{2+}$ on cells/PAMAM-rGO/ITO subtract Figure B. (G) The relative grayscale value across the white line in Figure C, D, E, F separately.