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Supplementary

Determination of 8-hydroxy-2'-deoxyguanosine oxidative stress biomarker using dysprosium oxide nanoparticles@reduced graphene oxide

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1. Materials

Double distilled water was used for all the experiments. 0.1 M phosphate buffer (pH 7.0) prepared from sodium dihydrogen phosphate and disodium hydrogen phosphate was used as supporting electrolyte. Human blood serum, and urine samples were acquired from Chang Gung University, Taiwan. The research protocols of human blood serum and urine samples experiments were followed as per the laws and institutional guidelines of Chang Gung University, Taiwan.

2. Instrumentation

Electrochemical studies were performed in a screen-printed carbon electrode (SPCE) (Bioanalytical Systems, Inc., USA), in which printed carbon acts as a working electrode (area 0.071 cm^2), Ag/AgCl as a reference electrode, carbon as a counter electrode and rotating disc electrode (area 0.21 cm^2). All the electrochemical measurements were carried out using CHI 1205A electrochemical workstation (CH Instruments, Inc., U.S.A) at ambient conditions. Prior to each electrochemical experiment, the electrolyte solutions were deoxygenated with pre-purified nitrogen for 15 min. Field-emission scanning electron microscope (FESEM), High resolution transmission electron microscope (HR-TEM) was performed using XPERT-PRO (PANalytical B.V., The Netherlands) diffractometer (Cu Ka radiation, k= 1.54 Å). X-ray proton emission (XPS). Horiba Emax x-act (Sensor + 24 V=16 W, resolution at 5.9 keV) was used to perform Energy-dispersive X-ray (EDX) spectra. EIM6ex Zahner (Kronach, Germany) was used for electrochemical impedance spectroscopy (EIS) studies.

3. Optimizations

The optimization of mass loading/thickness of electrode is more important and can be influence the sensitivity of the electrode. Here, the effect of loading of electrode on electrochemical of $Dy_2O_3@GO$ for the detection of 8-OHdG was investigated by cyclic voltammetry and corresponding histogram shown in figure S1. The result reports that the 8 µL of drop casted on the electrode has good intensity (µA) and sensitivity. Hence, 8 µL drop casted was used as an optimum for the experiments.



Figure S1. The effect of loading on $Dy_2O_3@GO$ towards cyclic voltammetry of 50 μ M 8-OHdG containing phosphate buffer (pH7) at a scan rate of 50 mVs⁻¹.



Figure S2. The FE-SEM image of GO.



Figure S3. The corresponding EDX image of GO and the quantitative analysis of C and O elements.



Figure 4S. The EDX mapping images of C and O elements in GO.