Electronic Supplementary Material (ESI) for RSC Advances.

SUPPLEMENTARY INFORMATION MANUSCRIPT RIVAS ET AL.

Electrochemical sensing of guanine, adenine and 8-hydroxy-2'-deoxyguanosine at glassy carbon modified with single-walled carbon nanotubes covalently functionalized with lysine

Alejandro Gutiérrez[a], Fabiana A. Gutiérrez[a], Marcos Eguílaz[a], José M. González-Domínguez[b,c] , Javier Hernández-Ferrer[b], Alejandro Ansón-Casaos[b], María T. Martínez[b,*] and Gustavo A. Rivas[a,*]

Figure 1-Supplementary information

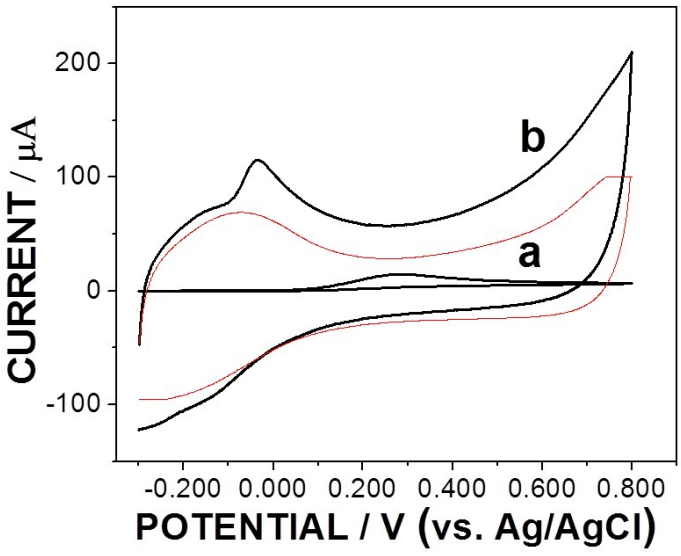

Figure 1 SI. Cyclic voltammograms obtained at GCE (a), GCE/SWCNT-Lys (b) for 1.0×10^{-3} M AA. For comparison, the potentiodynamic profile obtained at GCE/SWCNT-Lys in the supporting electrolyte solution (without AA) is also shown in red line. Scan rate: 0.050 Vs^{-1}, supporting electrolyte: 0.050 M phosphate buffer solution pH 7.40.

Table 1-Supplementary information

We have performed several controls experiments evaluating the response of dsDNA and the mixture of dsDNA and 8-OHdG after accumulation and medium exchange at different electrodes: GCE, GCE modified with SWCNT without the oxidative treatment, GCE modified with the oxidized SWCNT, and GCE modified with SWCNT containing the covalently attached 8-OHdG.

Electrode	200ppm DNA	200ppm DNA + 3.0 x 10^{-5}M 8-OHdG
GCE	***Guanine:*** E_{gua}:0.781 V i_{gua}: 0.027µA ***Adenine:*** No peak	***Guanine:*** E_{gua}:0.79 V i_{gua}: 0.028µA ***Adenine:*** No peak **8-OHdG:** No peak
GCE/SWCNT	***Guanine:*** E_{gua}:0.768 V i_{gua}: 0.095µA ***Adenine:*** No peak	***Guanine:*** E_g:0.767 V i_g: 0.1µA ***Adenine*** No peak **8-OHdG:** No peak
GCE/SWCNT-ox	***Guanine:*** No peak ***Adenine:*** No peak	***Guanine:*** No peak ***Adenine:*** No peak ***8-OHdG:*** E_{8OH}:0.534 V i_{8OH}:20µA
GCE/SWCNT-Lys	**Guanine** E_{gua}:0.828 V i_{gua}: 57µA **Adenine** E_{ad}:1.19 V i_{ad}: 16µA	**Guanine:** E_{gua}:0.821 V i_{gua}: 43µA **Adenine** E_{ad}:1.174 V i_{ad}: 14µA **8-OHdG** E_{8OH}:0.52 V i_{8OH}:32µA

Response to dsDNA:

It is clear that the response of dsDNA at bare GCE under our experimental conditions is very poor, showing just a small signal for guanine electrooxidation, without evidences of adenine oxidation. The response improves in the presence of SWCNT, although the oxidation signal of adenine is still missing. At GCE modified with oxidized SWCNT, the response is worse than in the previous cases due to the most difficult adsorption of dsDNA, a negatively charged polymer, at the surface of the electrode containing the carboxylated SWCNT. When using GCE/SWCNT-Lys, the response largely increases and it is possible to differentiate the contributions of guanine and adenine electrooxidation.

Response to dsDNA + 8-OHdG:

The comparison of the different cyclic voltammograms demonstrates that only at GCE/SWCNT-Lys is posible to simultaneously detect the electrooxidation of guanine, adenine and 8-OHdG. The CVs obtained at GCE and GCE/SWCNT show only the electrooxidation of guanine residues, while at GCE/SWCNT-ox the only signal was the one due to the electrooxidation of 8-OHdG, indicating that at this carboxylated surface the adsorption of the negatively charged dsDNA is very poor. These results are clear evidence of the advantages of the proposed sensor not only for the detection of dsDNA nucleobases, but also and even more important, to detect small amounts of 8-OHdG in the presence of dsDNA.