

Supplementary material:

Preconcentration-Enhanced Electrochemical Detection of Paraoxon in Food and Environmental Samples Using Reduced Graphene Oxide-Modified Disposable Sensors

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Graphene Oxide Synthesis

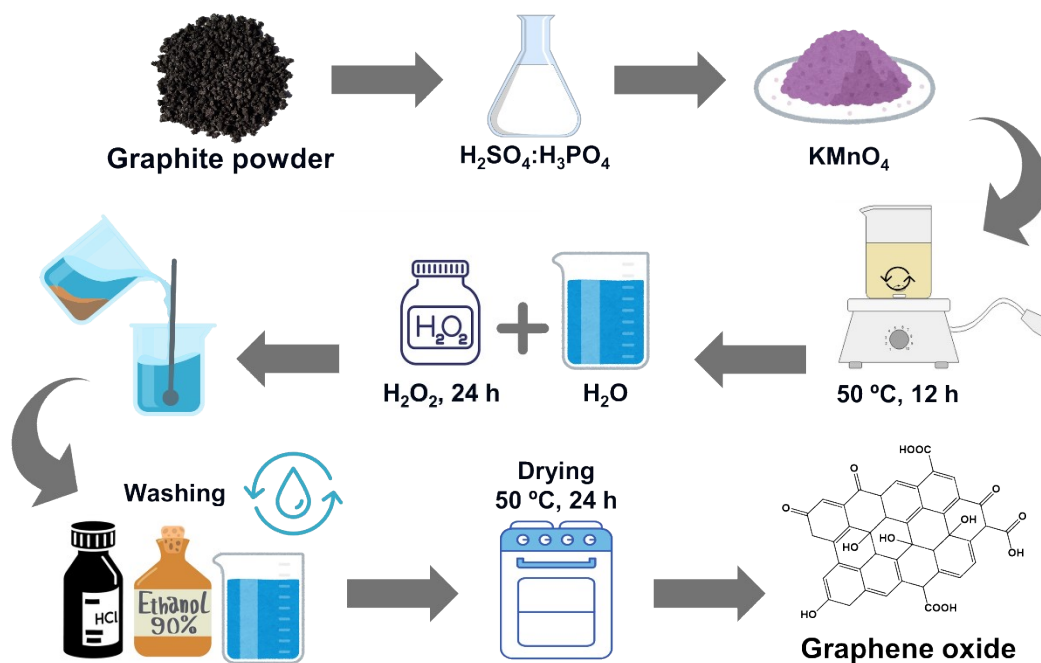


Figure S1. Scheme of the synthesis of graphene oxide using a Hummers modified method.

SEM Analyses

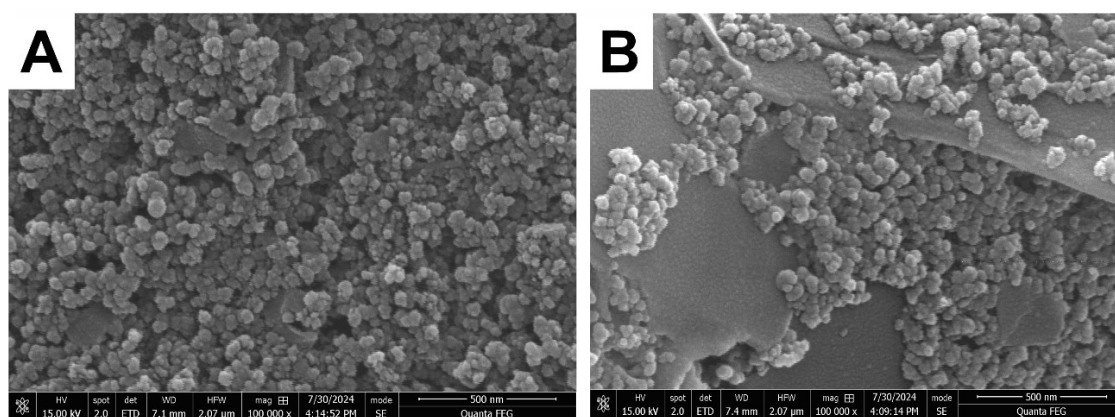


Figure S2. SEM images obtained with magnification of 100,000 \times for the (A) SPCE and rGO-SPCE surfaces.

Water Contact Angle Study

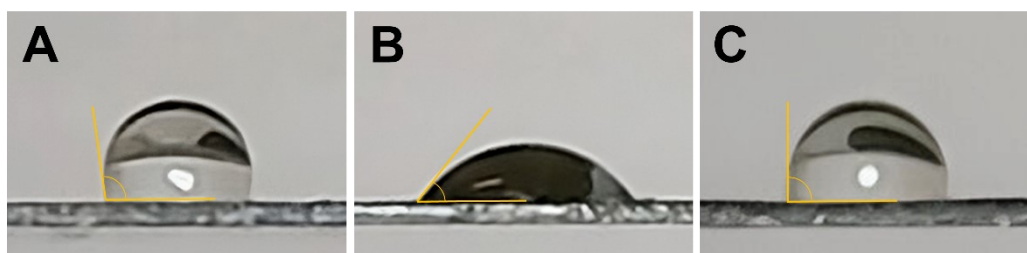


Figure S3. Water contact angle measurements performed for the SPCE (A), GO-SPCE (B), and rGO-SPCE (C) surfaces.

Influence of the SPCE modified with rGO

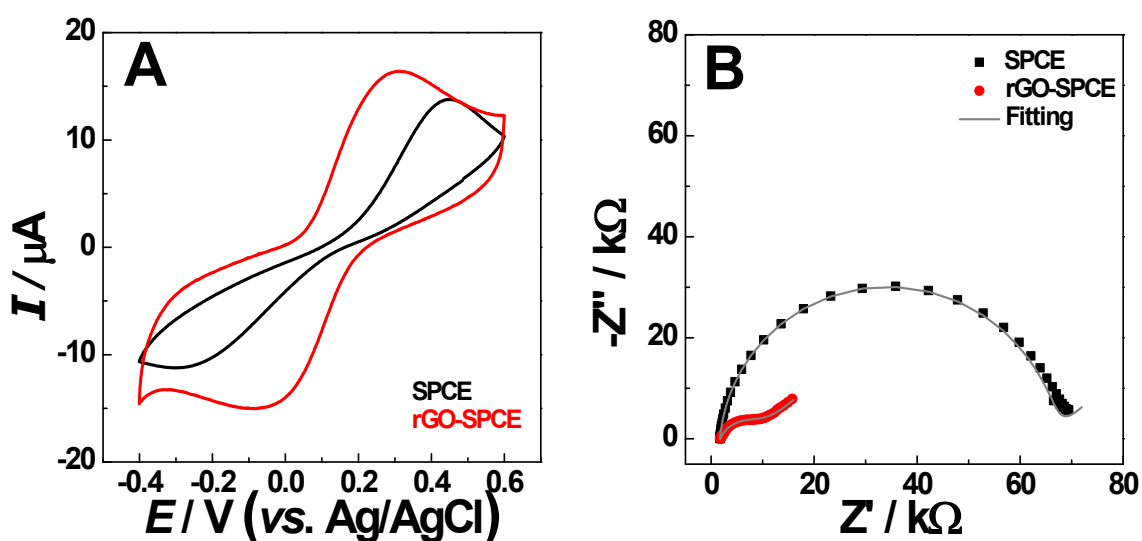


Figure S4. (A) Cyclic voltammograms at 25 mV s^{-1} and (B) electrochemical impedance spectra obtained for SPCE before and after rGO modification in 1.0 mmol L^{-1} potassium hexacyanoferrate (II). Fitting (gray line) was obtained against the equivalent Randles circuit. Supporting electrolyte: 0.10 mol L^{-1} KCl.

Table S1. Voltammetric and impedimetric behaviour obtained for the SPCE before and after rGO modification in 1.0 mmol L^{-1} potassium hexacyanoferrate (II).

Electrode	I_{pa} (μA)	I_{pc} (μA)	ΔE_p (mV)	R_{ct} ($k\Omega$)
SPCE	8.24	5.39	0.662	64.5
rGO-SPCE	12.6	11.0	0.320	8.53

I_{pa} : Anodic peak current; I_{pc} : Cathodic peak current; ΔE_p : Peak-to-peak separation; R_{ct} : Charge-transfer resistance.

Scan Rate Study

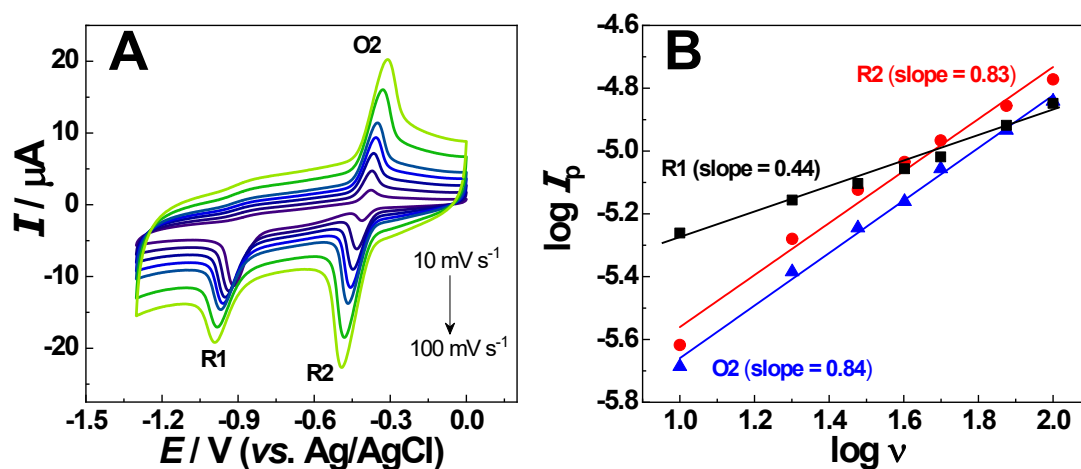


Figure S5. Scan rate study performed using the SPCE in the presence of $100 \mu\text{mol L}^{-1}$ paraoxon. (A) Cyclic voltammograms and (B) $\log v$ versus $\log I_p$ plot obtained for the reversible redox peaks (O2 and R2).

Influence of pH

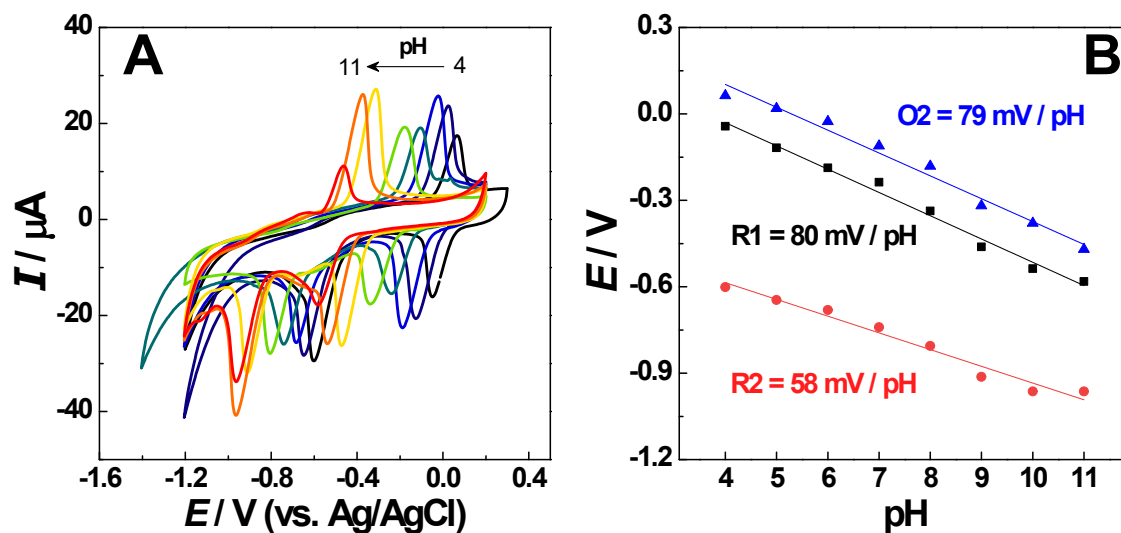


Figure S6. Influence of pH (4–11) for the determination of $100 \mu\text{mol L}^{-1}$ paraoxon using the unmodified SPCE.

Pulse Current Response

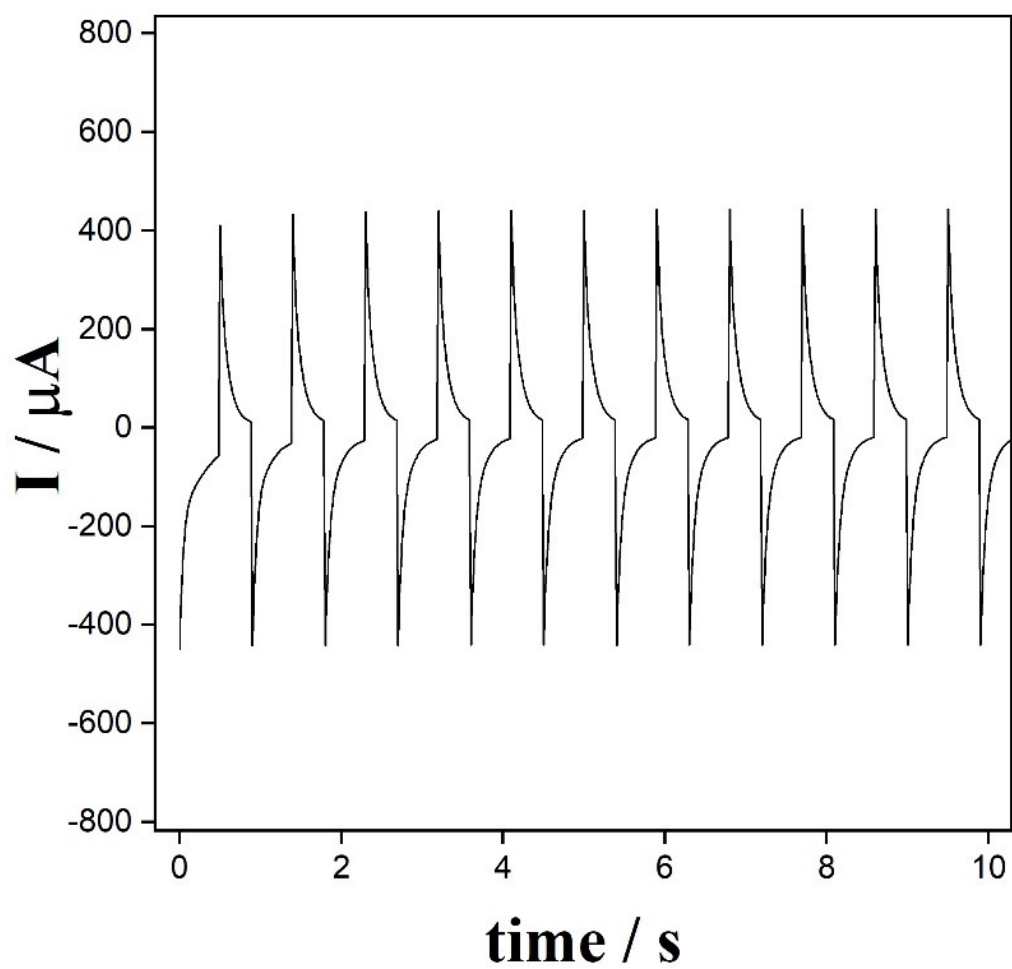


Figure S7. Current response of preconcentration step at the presence of $20 \mu\text{mol L}^{-1}$ paraoxon. Pulse cycle consist of 500 ms at -1.0 V and 200 ms at 0.0 V . Supporting electrolyte: 0.10 mol L^{-1} BR buffer, pH 9.0.

Interferents Study

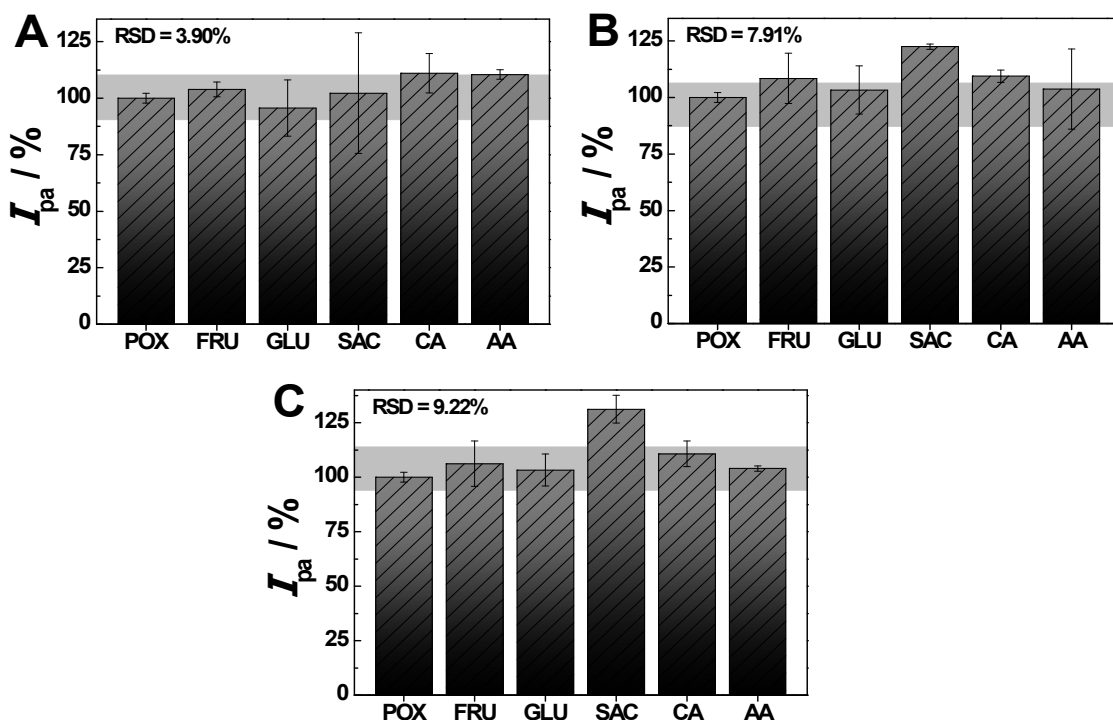


Figure S8. Signal variation obtained for the determination of 10 $\mu\text{mol L}^{-1}$ paraoxon in the presence of interferent species (fructose, glucose, sucrose, citric acid, and ascorbic acid) at three levels of concentration: (A) 1.0, (B) 10, and (C) 100 $\mu\text{mol L}^{-1}$.

Table S2. Signal variation obtained for the determination of paraoxon in the presence of interferent species (n = 3).

Interferent	Concentration		
	1.0 $\mu\text{mol L}^{-1}$	10 $\mu\text{mol L}^{-1}$	100 $\mu\text{mol L}^{-1}$
Fructose	+3.90	+8.46	+6.20
Glucose	-4.36	+3.33	+3.28
Sucrose	+2.24	+22.5	+31.2
Citric acid	+11.1	+9.43	+10.7
Ascorbic acid	+10.5	+3.75	+4.00