Supporting Information for the Paper

Development of sustainable electrodes based on cobalt ferrite decorated biochar for the voltammetric determination of

paracetamol at biological fluids

Noemí Cristina Silva de Souza^a, Gustavo Alves Puiatti^b, Gessica do Carmo Dias^a, Rafael Matias Silva^a, Renata Pereira Lopes Moreira^a, Tiago Almeida Silva^{a, *}

^aDepartment of Chemistry, Federal University of Viçosa, 36570-900, Viçosa-MG, Brazil.

^bDepartment of Civil Engineering, Federal University of Viçosa, 36570-900, Viçosa-MG, Brazil.

*Corresponding author:

Prof. Dr. Tiago Almeida Silva

(Tel.: +55 31 3612-6611, e-mail: tiago.a.silva@ufv.br)



Figure S1. Chemical mapping obtained for BC/CoFe₂O₄. (a) Part of the sample where mapping was performed, (b) Oxygen , (c) Carbon, (d) Cobalt, (e) Iron and (f) EDS spectrum for BC/CoFe₂O₄.



Figure S2. Cyclic voltammograms obtained in 0.1 mol L⁻¹ phosphate buffer solution (pH 7.0) in the absence and presence of 4.95×10^{-4} mol L⁻¹ PAR using bare CPE and CPE modified with different content of BC/CoFe₂O₄. *v* = 100.0 mV s⁻¹.



Figure S3. Cyclic voltammograms obtained in 0.1 mol L⁻¹ phosphate buffer solution (pH 7.0) in the presence of 4.95×10^{-4} mol L⁻¹ PAR using bare GCE, bare CPE and CPE BC/CoFe₂O₄ 25. *v* = 100.0 mV s⁻¹.



Figure S4. (a) Nyquist plots obtained in 0.1 mol L⁻¹ phosphate buffer solution (pH 7.0) in the presence of 4.95×10^{-4} mol L⁻¹ PAR using bare CPE and CPE modified with different content of BC/CoFe₂O₄. EIS conditions: applied potential = half-wave potential, frequency range: 100 kHz to 100 mHz and amplitude = 10 mV. **(b)** Randles equivalent circuit used to fit the Nyquist plot recorded for (i) CPE, CPE-BC 15, CPE-BC/CoFe₂O₄ 25 and CPE-BC/CoFe₂O₄ 50 and (ii) CPE-BC/CoFe₂O₄ 15.



Figure S5. Cyclic voltammograms obtained for PAR at different pHs of the supporting electrolyte using the BC/CoFe₂O₄ CPE 25: (a) 2.0; (b) 4.0; (c) 6.0; (d) 7.0; (e) 8.0 and (f) 10.0. v = 100.0 mV s⁻¹.



Figure S6. Graphic of (a) I_{pa} vs. pH and (b) E_{pa} vs. pH obtained for PAR using CPE-BC/CoFe₂O₄ 25. (c) Possible redox reaction for PAR molecule.

Parameter	Studied range	Selected value
Modulation amplitude (mV)	10 - 120	100
Scan rate (mV s⁻¹)	5 - 20	10
Modulation time (ms)	5 - 50	40

Table S1. Optimization of the DPV parameters for PAR determination at concentration of 4.95×10^{-4} mol L⁻¹.

Concomitant substance	Ratio analyte: concomitant	E * (%)
Urea	1:1	-5.96
	1:10	-9.81
Ascorbic Acid	1:1	+1.73
	1:10	+5.97
Na ⁺ and K ⁺ ions	1:1	-1.22
	1:10	-3.31
Glucose	1:1	-0.75
	1:10	+6.21

Table S2. Results of the possible interferent studies.

* $E(\%) = [(Analyte signal_{presence} - Analyte signal_{absence}) / Analyte signal_{absence}] \times 100\%.$