Supplementary Information

Low-cost and portable 3D-printed sensor for the determination of secnidazole in pharmaceutical and seized drug samples

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Figure S1. (A) Photographs of the disassembled 10 mL 3D-printed cell, showing: **(a)** reservoir; **(b)** lid; **(c)** base; **(d)** screws; **(B)** Photograph of the 3D-working electrode (CB/PLA); **(C)** Photograph of the assembled 10 mL 3D-printed cell with the CB/PLA electrode in place.



Figure S2. Cyclic voltammetric response obtained in the presence of $[Fe(CN)_6]^{3-/4-}$ in the concentration of 1 mmol L⁻¹ in 0.1 mol L⁻¹ KCl solution, using the 3D-printed CB/PLA electrode before (black line) and after (blue line) electrochemical treatment. The dashed lines refer the blank of analysis. CV conditions: scan rate = 50 mV s⁻¹ and step potential = 5 mV.



Figure S3. (A) Cyclic voltammograms obtained for the reduction of 50 μ mol L⁻¹ SCZ in BR buffer at pH 2.0 (0.12 mol L⁻¹) in scan rates ranging from 1 to 200 mV s⁻¹. Graphs illustrate the relationships between and: **(B)** reduction current (Ip) versus scan rate (v), (C) reduction current (Ip) versus square root of the scan rate; **(D)** log of Ip versus the log of scan rate (v). Working electrode: CB/PLA; potential step: 5 mV.



Figure S4. (A) Baseline-corrected SWV voltammograms obtained as a function of variation in potential step; **(B)** Impact of the potential step variation on reduction current intensity and peak width. Analyte: 50 μ mol L⁻¹ SCZ in BR buffer at pH 2.0. Experimental conditions: *a*: 20 mV; *f*: 25 Hz.



Figure S5. (A) Baseline-corrected SWV voltammograms obtained as a function of variation in amplitude; **(B)** Influence of amplitude on reduction current intensity and peak width. Analyte: 50 μ mol L⁻¹ SCZ in BR buffer at pH 2.0. Experimental conditions: Δ E: 5 mV; f: 25 Hz



Figure S6. (A) Baseline-corrected SWV voltammograms obtained as a function of frequency variation; **(B)** Effect of frequency on reduction current intensity and peak width. Analyte: 50 μ mol L⁻¹ SCZ in BR buffer at pH 2.0. Experimental conditions: amplitude: 40 mV; Δ E: 5 Mv.



Figure S7. Correlation between peak potential of SCZ and the logarithm of frequency. Supporting electrolyte: 0.12 mol L⁻¹ BR buffer (pH = 2.0); [SCZ] = 50 μ mol L⁻¹. SWV technique parameters: ΔE = 5 mV; a = 40 mV; f = 40 Hz.



Figure S8. SWV scans obtained for the repetitive analysis of solutions with 10.0 (black square) and 100.0 (red circle) μ mol L⁻¹ of SCZ. Supporting electrolyte: 0.12 mol L⁻¹ BR buffer (pH = 2.0); SWV parameters: $\Delta E = 5$ mV; a = 40 mV; f = 40 Hz.



Figure S9. Inter-electrode reproducibility test using three different CB/PLA devices. SCZ concentration: 100 μ mol L⁻¹; supporting electrolyte: 0.12 mol L⁻¹ BR buffer (pH = 2.0); SWV parameters: $\Delta E = 5$ mV; a = 40 mV; f = 40 Hz.



Figure S10. Representative CG-MS data from seized samples containing SCZ. **(A)** Total ion chromatograms from tablets from different seizures, showing: 1. SCZ (Rt = 11.185-11.218 min), 2. Caffeine (Rt = 13.200 min), 3. Ketamine (Rt = 13.621 min), 4. Theophylline (Rt = 14.206-14.346 min), 5. Palmitic acid (Rt = 16.478 min), 6. Stearic acid (Rt = 18.794 min); **(B)** Mass spectra of SCZ corresponding to the samples in (A). Molecular mass of SCZ = 185 g mol⁻¹.



Figure S11. Baseline-corrected SWV voltammograms for pharmaceutical (P2 and P3) and seized (S2 and S3) samples analyzed using the standard addition method, along with their respective calibration curves. The concentration of SCZ in sample S1 was below the LOD (40 μ mol L⁻¹ of SCZ was added to the sample solution). Supporting electrolyte: 0.12 mol L⁻¹ BR buffer (pH = 2.0); SWV parameters: $\Delta E = 5$ mV, amplitude = 40 mV, and frequency = 40 Hz.



Figure S12. Percentage variation in reduction current for solutions containing only SCZ and SCZ + caffeine (CAF), SCZ + theophylline (THE), SCZ + ketamine (KET), SCZ + fenproporex (FPX). SWV parameters: $\Delta E = 5 \text{ mV}$, a = 40 mV, and f = 40 Hz. Concentration of SCZ and interfering species = 10 µmol L⁻¹.

Printing parameters	Condition
Orientation	Vertical
Infil Density	100 %
Extruder Nozzle	0,4 mm
Printing Speed	50 mm s ⁻¹
Bed temperature	70 °C
Extruder Temperature	220 °C

Table S1. Printing parameters for the 3D fabrication of CB/PLA electrodes.