Electronic Supplementary Information (ESI)

A Dual Screen-Printed Electrode Separation Device For Twin Electrochemical Mini-cell Establishment

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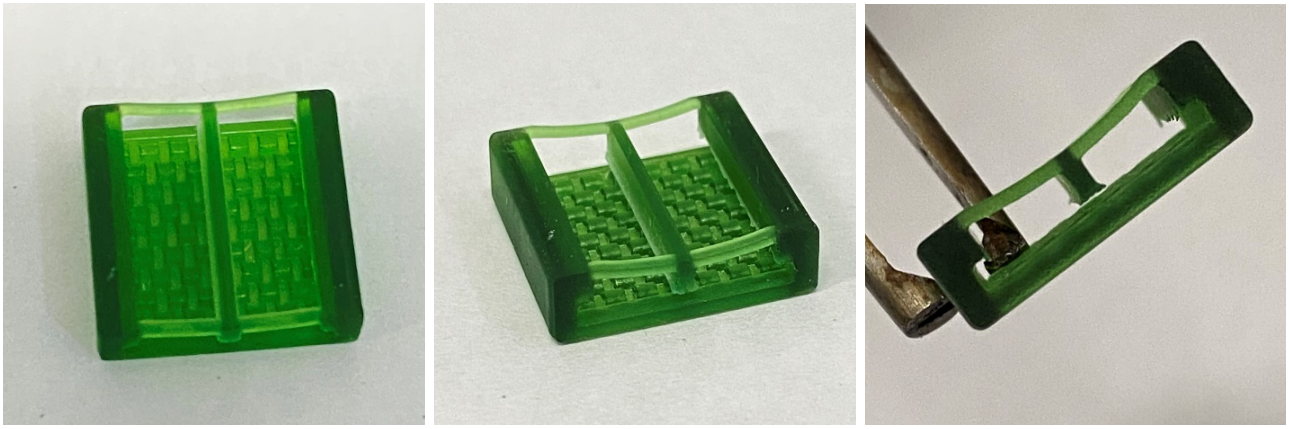


Figure S1. Photographs of a finished dual sensor screen-printed electrode sleeve that separates the two working electrodes to form twin electrochemical cells.

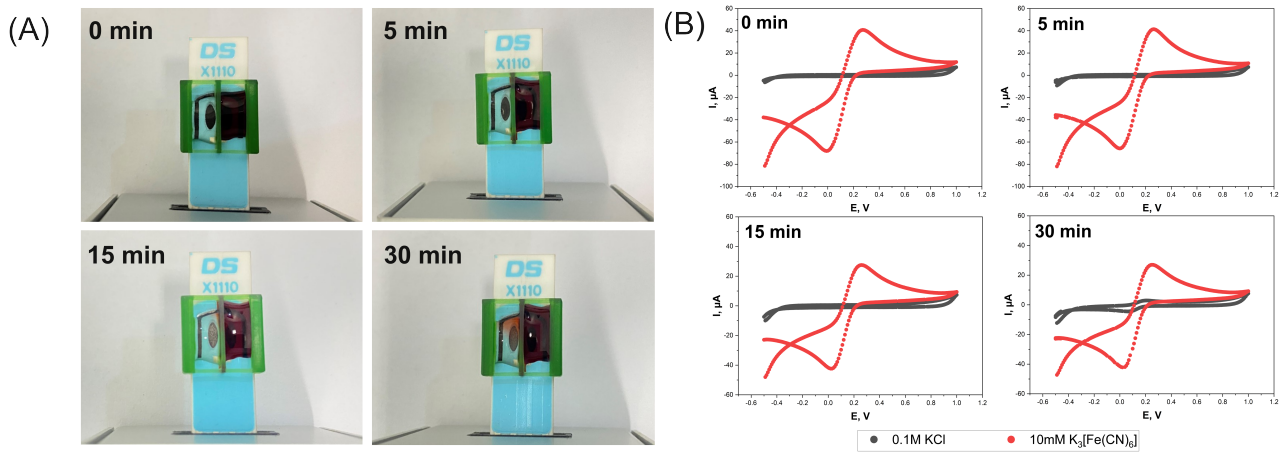
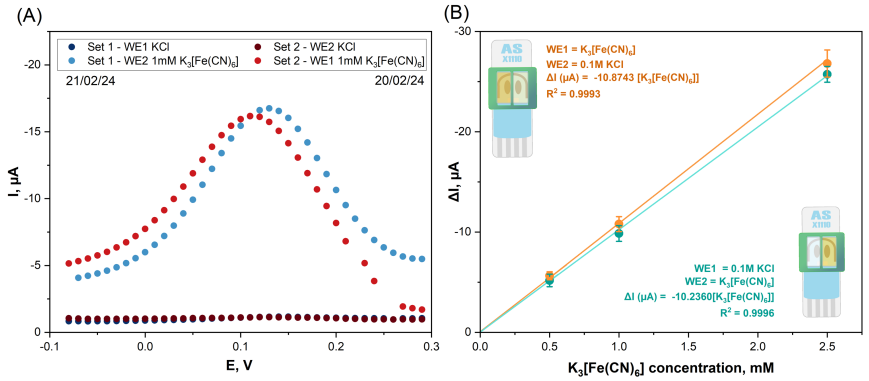
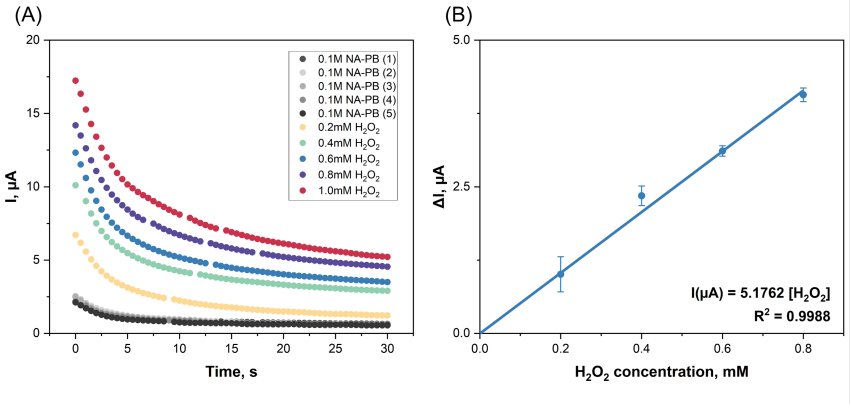


Figure S2. (A) Food color and (B) EC leak test with a dual sensor screen-printed electrode sleeve that was fitted to a SPE unit and formed twin compartments for solutions. For the visual leak test the left EC cell was filled with DI water, while the right contained a deep-red solution of food color. The snapshots show the status of the two separated liquids just after filling and 5, 15 and 30 min later. For the EC leak test, the left chamber was filled with 0.1 M KCl and the right one with 10 mM $K_3[Fe(CN)_6]$ in 0.1 M KCl. Cyclic voltammetry was performed at a scan rate of 0.1 V s-1 after 0 min, 5 min, 15 min and 30 minutes in the chamber with simple KCl (black) and ferricyanide/KCl (red) fillings.



Conc, mM	$K_3[Fe(CN)_6]$ at WE1, µA	$K_3[Fe(CN)_6]$ at WE2, µA
0.5	-5.17 ± 0.62	-5.65 ± 0.40
1	-9.86 ± 0.78	-10.80 ± 0.75
2.5	-25.73 ± 0.79	-26.81 ± 1.35

Figure S3. Electroanalysis suitability test I with the dual SPE/dual EC mini-cell approach. Differential pulse voltammetry (DPV) was conducted for ferricyanide as a model analyte and with WE1 and WE2 of the system exposed in their separate electrolyte compartments to either to 0.1 M KCl or 0.5, 1 or 2.5 mM of ferricyanide in 0.1 M KCl the DP, respectively. For the "left KCl/right ferricyanide" (set 1) and "right KCl/left ferricyanide" (set 2) cases examples of the original collections of DPV traces are shown in (A). Plots of the averaged background-corrected ferricyanide DPV peak amplitudes ($i_{ferricyanide}$-i_{KCl}) vs. the relevant ferricyanide concentrations are shown in (B). Data points are the averages of results from a triplicate assessment repetition (n=3) and error bars reflect their standard deviations. Exact values are listed in the neighboring table. Regression lines through the data points of both configurations are well linear, with regression coefficients (R^2) close to 1. Leak protection and about equality of WE1 and WE2 are obvious from the slope similarity and the virtual overlap of the data points, with small error bars.



$[H_2O_2]$, mM	I, µA
0.2	1.01 ± 0.30
0.4	2.35 ± 0.17
0.6	3.11 ± 0.09
0.8	4.07 ± 0.12

Figure S4. Electroanalysis suitability test II with the dual SPE/dual EC minicell approach. (A) Amperometry was conducted for hydrogen peroxide as a model analyte and with WE1 and WE2 of the system exposed in their separate electrolyte compartments to 0.1 M KCl (WE1) and increasing concentrations of H_2O_2 in 0.1 M KCl (WE2). (B) Plots of the background-corrected amperometric step heights ($\Delta I = i_{WE2} - i_{WE1}$) vs. $[H_2O_2]$ were linear, with R^2 close to 1. The H_2O_2 detection potential was 1 V vs. the internal Ag/AgCl SPE-RE. Data points are the mean of the step heights of the triplicate measurements and the error bars illustrate the standard deviation. . Exact values are listed in the neighboring table. A linear range up to about 0.8 mM is typical for H2O2 sensors without use of nanomaterial support of analyte signaling.

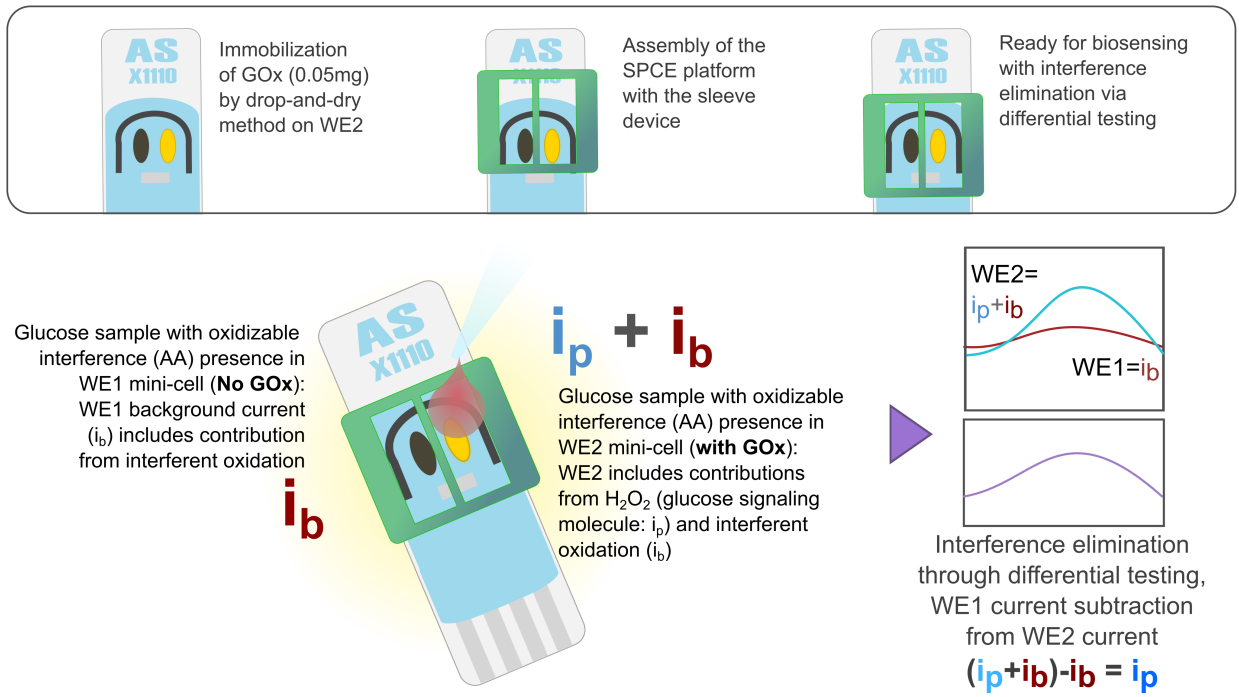


Figure S5. Schematic display of the proof-of-principle glucose biosensor interference elimination trial.