Electronic Supplementary Information

Simple cost-effective paper-based electrochemical device for detection of adulterated sibutramine in slimming products

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Appendix A

Evaluation of reproducibility of the production of the ePADs

One production process provides 16 ePADs. The pattern of the electrodes on one sheet is shown in Fig. S1.

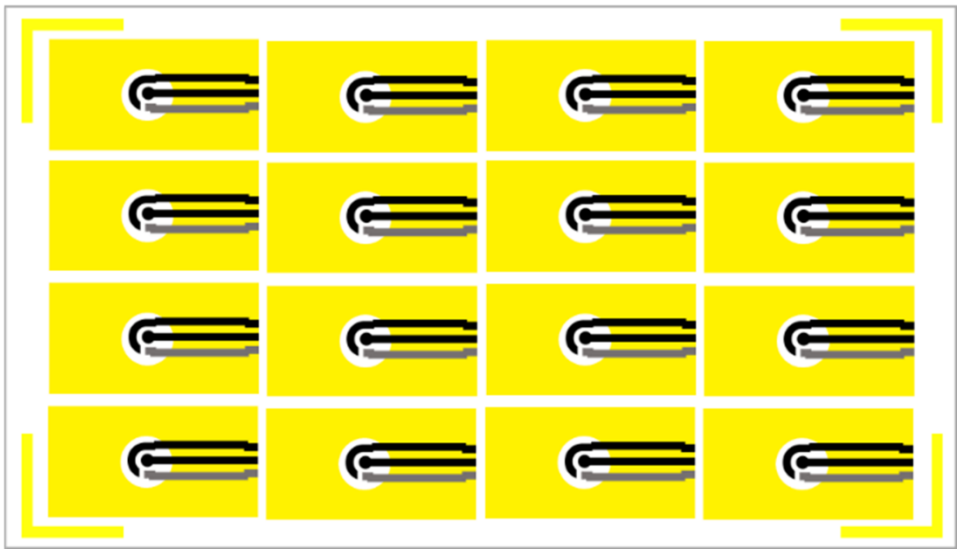


Fig. S1. Pattern of electrodes of single sheet. One production process provides 16 ePAD devices.

Each ePAD was tested by using the device to measure the cyclic voltammograms of a 6.0 mM $K_3Fe(CN)_6$ solution in 0.1 M KCl, as supporting electrolyte. The peak currents of anodic (i_{pa}) and cathodic (i_{pc}) scans were then determined. Fig. S2 is a scatter plot of the measured (i_{pa}) and (i_{pc}) of the 48 ePADs, divided into three sections, with control bands defined by the mean ± 3 SD of the 48 ePAD devices. It is observed that all the signals are within the control band, indicating that the production of ePAD by screen-printing method is reproducible.

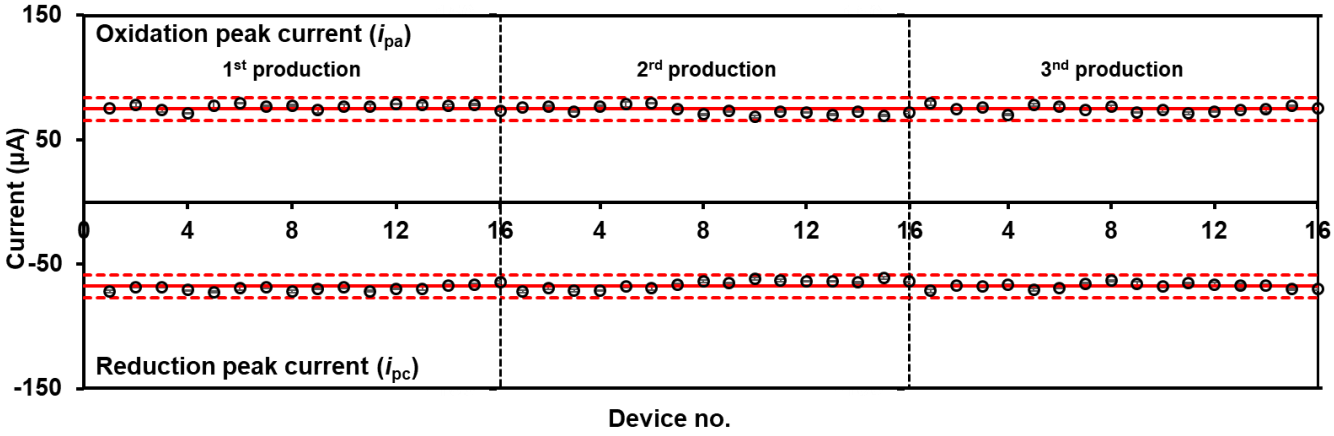


Fig. S2. Scatter plots of the measured oxidation (i_{pa}) and reduction (i_{pc}) peaks of 48 ePADs from three production processes. The solid horizontal lines are the mean of the oxidation (i_{pa}) and reduction (i_{pc}) peak currents and the dashed horizontal lines are mean ± 3SD of the 48 devices.

Then, we calculated the peak current ratio (i_{pa}/i_{pc}) obtained from each screen-printed sheet (16 ePAD devices). Table S2 shows the mean of peak current ratio from 16 devices in each production of ePAD is close to 1, indicating our ePAD device are the same as conventional electrochemical cell for measurement of the reversible redox reaction of $K_3Fe(CN)_6$.

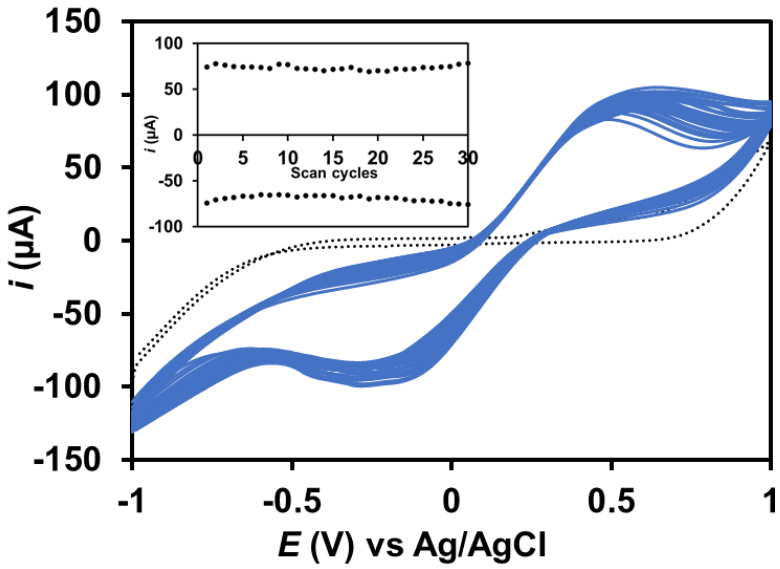


Fig. S3. Cyclic voltammograms of 6.0 mM $K_3Fe(CN)_6$ (solid lines) in 0.1 M KCl supporting electrolyte (dotted line) obtained from the ePAD device in the test of repeat use of the sensor: 30 scan-cycles of a single sensor.

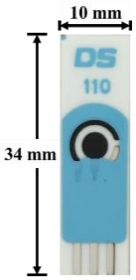
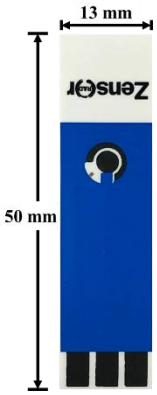
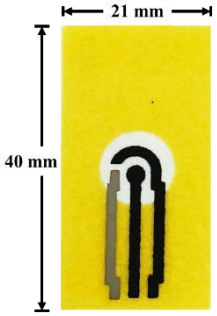
Table S1. Mean of the peak currents and peak current ratios (i_{pa}/i_{pc}) of 16 ePADS selected from 16 screen-printed sheets

Sheet	i_{pa} (μA)	i_{pc} (μA)	Peak current ratio (i_{pa}/i_{pc})
1	78 ± 4	69 ± 3	1.14 ± 0.08
2	72 ± 4	65 ± 4	1.12 ± 0.09
3	75 ± 4	68 ± 3	1.11 ± 0.08

Appendix B

Electrochemical cells used in this work

Table S2. Images and specifications of the four types of electrochemical cells used for the investigation of the voltammetric behavior of sibutramine

Type	Conventional	DropSens™	Zensor™	ePAD
Image of electrochemical cell				
Specification				
Type of material:				
Working electrode (WE)	Glassy carbon	Carbon	Carbon	Carbon
Counter electrode (CE)	Pt wire	Carbon	Carbon	Carbon
Reference electrode (RE)	Ag/AgCl	Ag/AgCl	Ag/AgCl	Ag/AgCl
Diameter of WE (mm)	2.5	4	3	2.5
Volume of sample (μL)	~20,000	40	40	60

Appendix C

Qualitative data for samples spiked with standard sibutramine

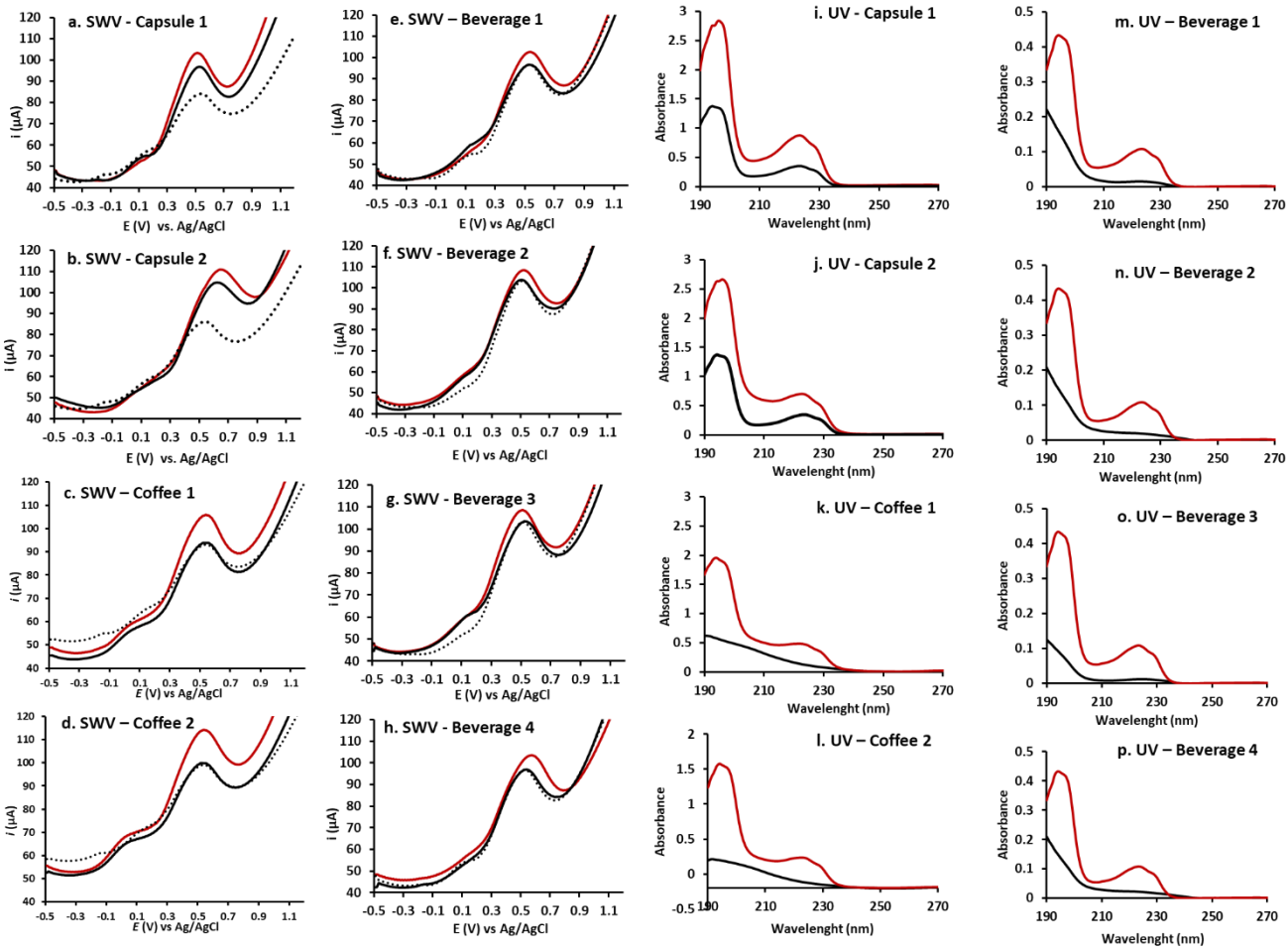


Fig. S4 Qualitative data of (a-h) square-wave voltammograms and (i-p) UV-vis spectra of eight samples (black lines) before and after spiking with standard sibutramine (red lines) and the background signals of the buffer solution (dotted lines).