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Supplementary Materials

Electrochemical Sensor for Methamphetamine Detection using Laser-induced Porous Graphene Electrode

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Portable electrochemical device fabrication

The portable electrochemical device contains an Emstat Pico Module potentiostat (PalmSens, www.palmsens.com/product/oem-emstat-pico-module/). The Emstat Pico Module potentiostat will connected to two connectors, including a USB to UART convertor (UMFT234XD-NC) used for connecting to a smartphone via a type-C USB connector and a screen-printed electrode (SPE) connector (DS1020-03ST1D) used for connecting to the LIG electrode (Figure S1). The body of the device was designed a three-dimensional (3D) model using the program Solid work 2020 and created with 3D Printer (GEEETECH E180 3D printer) by the fused deposition modeling (FDM) method using poly (lactic acid) (PLA) filament.

For the android smartphone (Motorola One) running the drug sensor application was used to control the portable electrochemical device. This application was developed from PalmSens Software Development Kits (SDKs) for .NET (www.palmsens.com/oem/sdkdotnet/), which has two modes (i) standard curve for standard detection and (ii) drug detection for real-sample analysis.

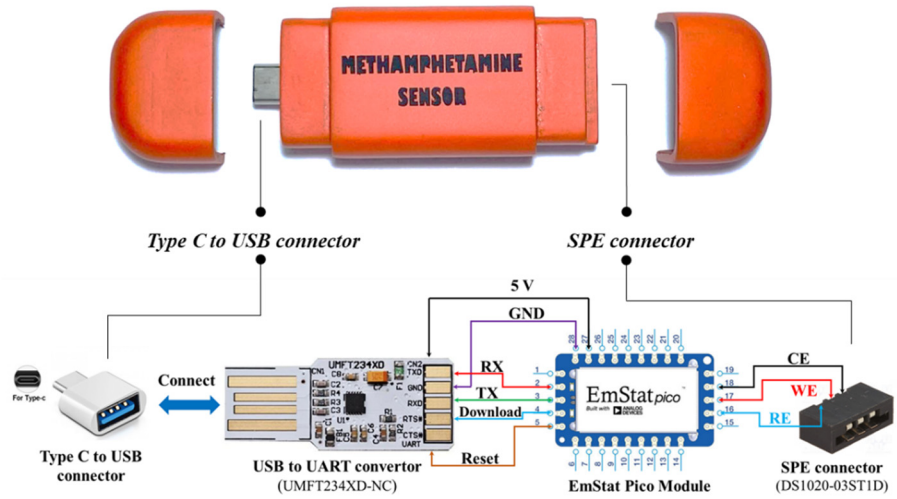

Figure S1. A portable electrochemical device and fully functional EmStat Pico USB connection with a USB to UART convertor to interface with a type-C USB connection and an SPE connector.

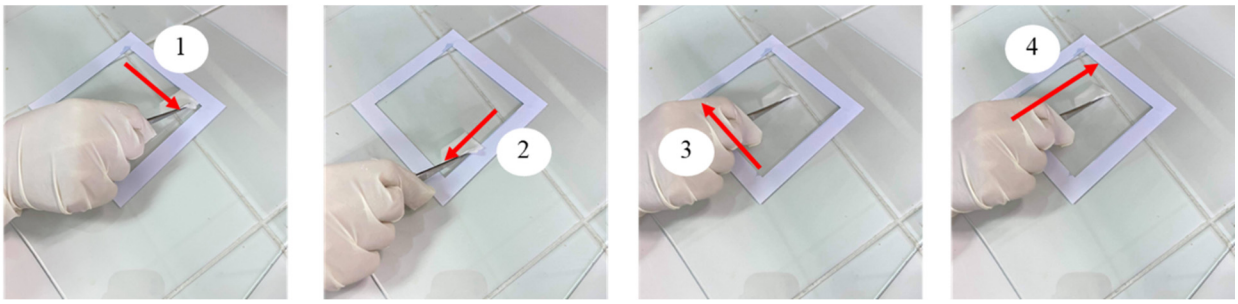

Figure S2. Illustration of wiping pattern on a sampling area of 100 cm² during the surface recovery experiment.

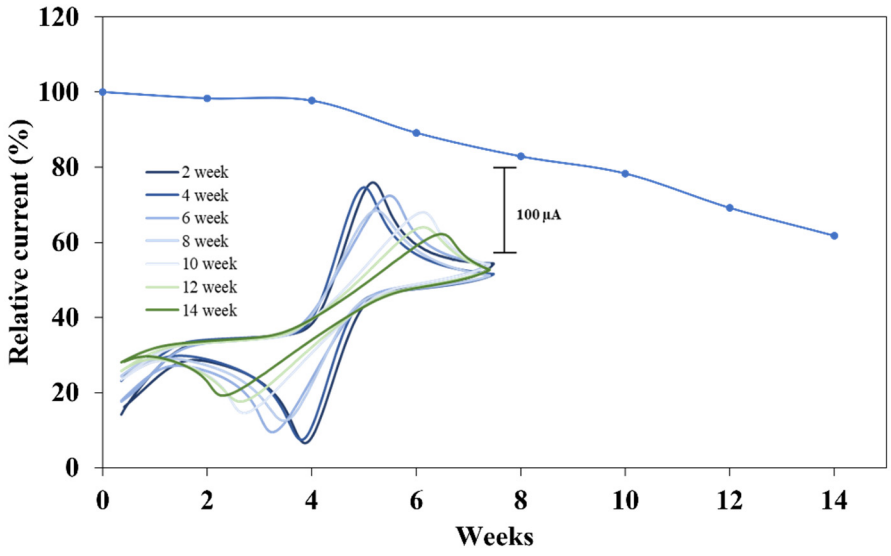

Figure S3. CVs and relative current response of 5.0 mM ferric/ferrocyanide on the LI-PGr electrode at different storage times (2, 4, 6, 8, 10, 12, and 14 weeks).

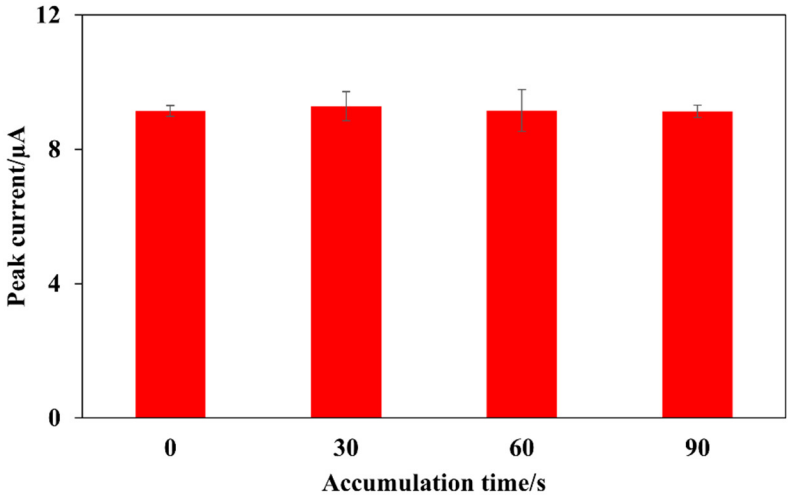

Figure S4. The effect of different pre-concentration times (0, 30, 60, and 90 s) on the peak current of 10.0 μg mL^{-1} MA at the LI-PGr electrode.

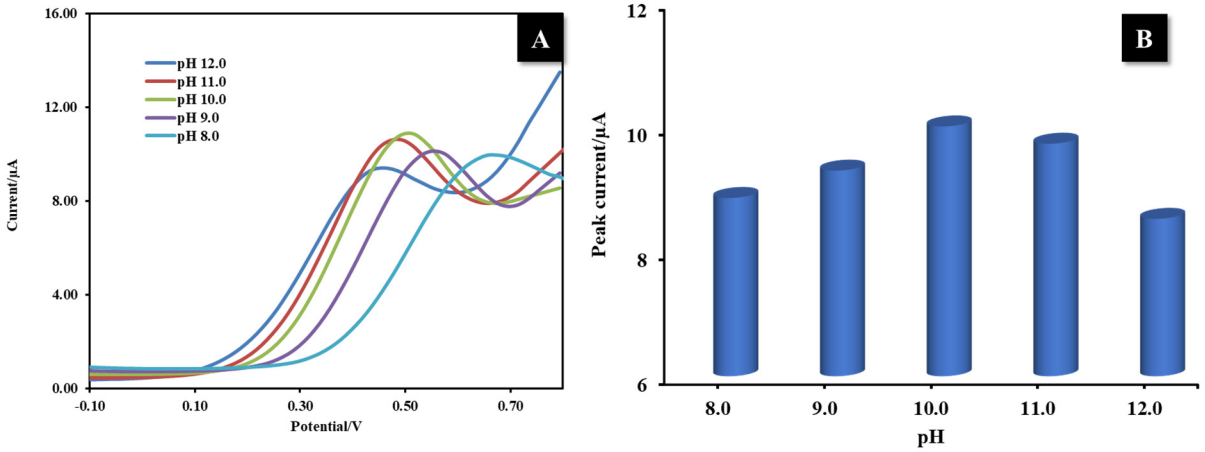

Figure S5. The effect of pH buffer on the peak current of 10.0 μg mL^{-1} MA at the LI-PGr electrode.

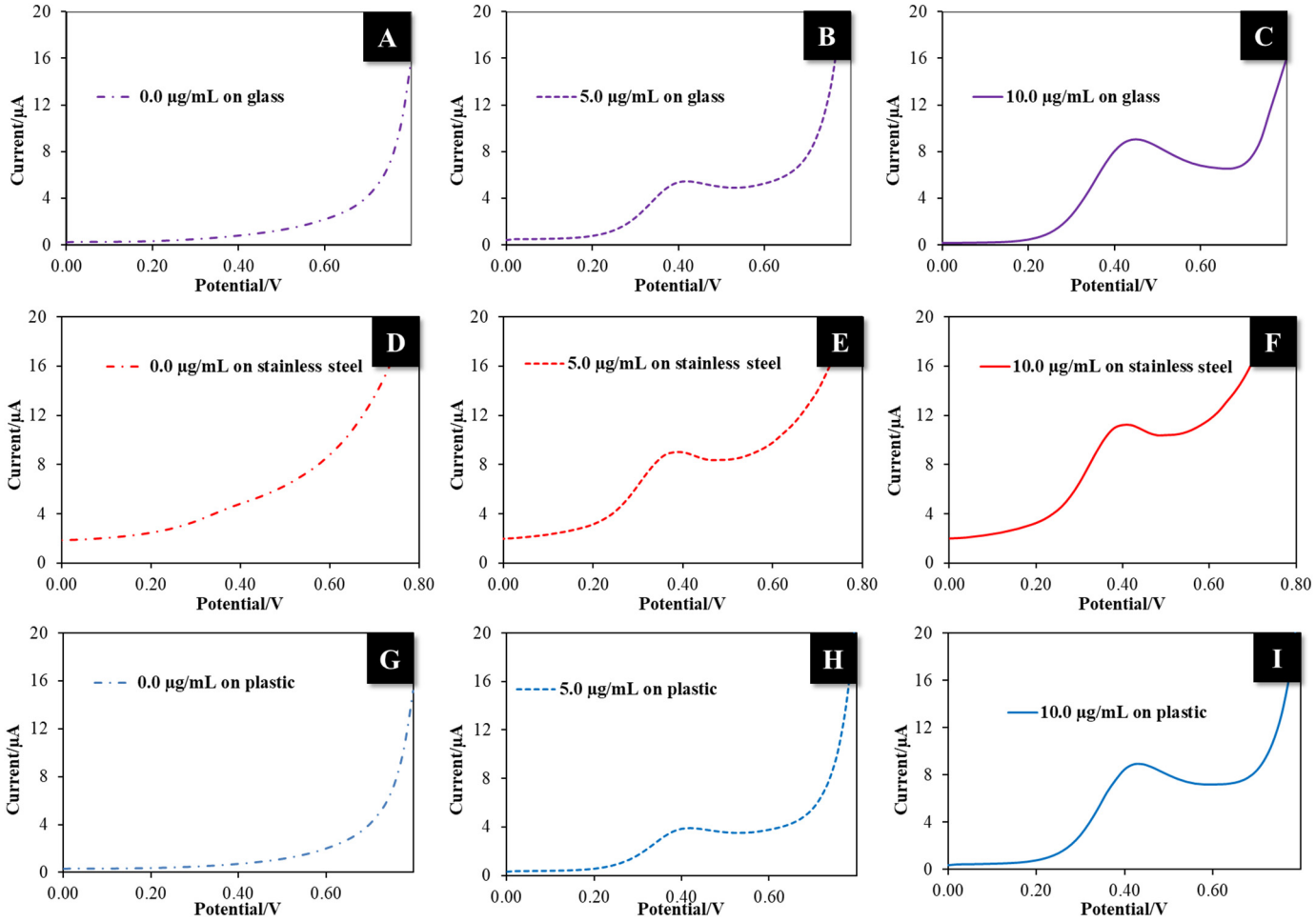

Figure S6. DPV responses of MA on the glass surface at the concentration of 0.0 (A), 5.0 (B) and 10.0 µg mL^{-1} (C); on the stainless-steel surface at the concentration of 0.0 (D), 5.0 (E) and 10.0 µg mL^{-1} (F); and on the plastic surface at the concentration of 0.0 (G), 5.0 (H) and 10.0 µg mL^{-1} (I).

Table S1. Comparison of analytical performances of the proposed MA sensor with some previously reported MA sensors.

Electrode	Method	Portability	Linear range (µg mL^{-1})	Limit of detection (µg mL^{-1})	Ref.
LI-PGr electrode	DPV	Yes	1.00 – 30.0, 30.0 - 100	0.31	This work
MIP/MWCNTs/CPE	FFT-SWV	No	0.0015 – 15	0.00012	[1]
MWCNT/Au-NPsHS-SiO_2/Fe_3O_4	SWV	No	0.0075 – 7.5	0.0024	[2]
PPGE	DPV	No	0.01 – 8.0	0.0075	[3]
GE/LC/PB/MPS/AuNP/Anti - MA	Amp	No	0.015 – 0.75	0.001	[4]
Aptamer/AuNPs/Chitosan/GCE	CV	No	-	0.0015	[5]
GCE/EDOT-BTDA-Pala/Antibody/ MA	DPV	No	10-100	0.014	[6]

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