Supporting Information

A Thumb-Size Electrochemical System for Portable Sensors

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Fabrication of the Screen Printed Electrdes

The SPE electrode pattern was printed onto the glass fiber plates though an automatic printing machine (AT-25P, ATMA Champ Ent. Co.). Silver ink (JT-1000, JVLONG Co. Ltd.) was firstly patterned on the substrate as conductive medium and cured at 100 °C for 10 min. Then the work electrode (planar area: 28.26 mm^2) and counter electrode were printed by using carbon ink (EDAG 423SS, LOCTITE Co.) and dried at 90 °C for 10 min. The Ag/AgCl ink (JLL-1000, JVLONG Co. Ltd.) was printed as reference electrode. Finally, the insulating ink (TP-40, JINYI Co. Ltd.) was printed as the insulation layer. Fresh SPEs were used in the experiments without pretreatment.

Quantitative Determination of Cd^{2+} and Pb^{2+} in river water by the MiniEC

To evaluate the usefulness of the MiniEC in heavy metal detection, the river water sample was collected and analyzed for trace of Cd^{2+} and Pb^{2+}. Sample solutions were prepared using the river water with addition of acetate to a final concentration of 0.1 M. $Pb(NO_3)_2$ and $Cd(NO_3)_2$ was added into the sample solution for detection at different concentrations (0, 1, 2, 3, 5μg/L). The Bi-coated SPE was used after the calibration curves were measured (**Figure 5**). DPASV was used to determine the concentration of Cd^{2+} and Pb^{2+} in the sample solutions by using the same parameters as described in the

manuscript **(Figure S1)**. As a result, the river water spiked with a mixture of the Cd^{2+} and Pb^{2+} gave recoveries of 92.1-108.9% (**Table S1**). This demonstrated that the river water sample had virtually no effect on the performance of the method proposed.

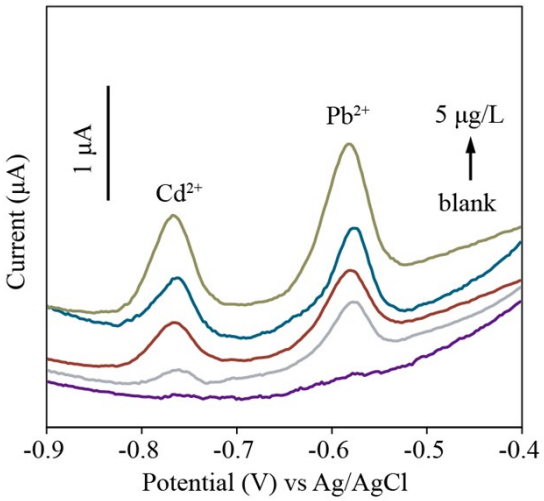

Figure S1. Voltammogram for Cd^{2+} and Pb^{2+} at different concentrations (0, 1, 2, 3, 5 μg/L) in river water

Table S1. Peak current of Cd^{2+} and Pb^{2+} in Figure S1 and the value of recovery.

Add amount (μg/L)	Peak current of Cd^{2+} (μA)	Recovery of Cd^{2+} (%)	Peak current of Pb^{2+} (μA)	Recovery of Pb^{2+} (%)
1	0.1422	92.6	0.4153	108.9
2	0.3585	108.9	0.5729	101.1
3	0.4651	92.1	0.8121	108.0
5	0.8112	94.8	1.1915	106.1