Enhanced detection of toxicity in wastewater using 2D smooth plane anode based microbial fuel cell toxicity sensor

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Table S1. The concentration of the free lead ions in MFCs

| Theoretical concentration | Actual concentration |
|---------------------------|---------------------|
| 1.0 mg/L                  | 0.989 ± 0.011 mg/L  |
| 2.0 mg/L                  | 1.916 ± 0.027 mg/L  |

Table S2. The pH change of wastewater after introduction of lead nitrate standard solution

|                   | 30 min  | 60 min  | 120 min |
|-------------------|---------|---------|---------|
| Wastewater        | 9.18 ± 0.03 | 9.18 ± 0.03 | 9.18 ± 0.02 |
| Wastewater+ 1.0 mg/L Pb^{2+} | 9.15 ± 0.02 | 9.15 ± 0.02 | 9.15 ± 0.04 |
| Wastewater+ 2.0 mg/L Pb^{2+} | 9.13 ± 0.04 | 9.13 ± 0.05 | 9.12 ± 0.05 |

Fig. S1. The voltage output of three consecutive cycles of the MFC sensors.
Fig. S2. SEM image of pristine anodes: (a) carbon felt and (b) ITO film. Water contact angles of pristine anodes: (c) carbon felt and (d) ITO film.
Fig. S3. XRD patterns of (a) ITO anode and (b) CF anode

Fig. S4. N$_2$ adsorption – desorption isotherm plot of carbon felt and ITO film.

N$_2$ adsorption/desorption isotherms at 77 K were measured on BET relative surface area analyzer. Samples were filled in a tube and allowed to dry for 4 h at 100 °C prior to the measurements. After the test, 4~5 data points were selected to make the diagram and then the slope and intercept were calculated. The relative surface area was then calculated based on the BET equation.$^1$
**Fig. S5** Voltage recovery of MFC sensors with fresh wastewater and 300 mg L\(^{-1}\) sodium acetate after 0.5 mg L\(^{-1}\) and 0.8 mg L\(^{-1}\) Pb\(^{2+}\) shocks

**Fig. S6.** Confocal laser scanning microscopy image of anodic biofilm cultivated on ITO film surface (part of the biofilm was scratched using a clean scalpel to show the biofilm thickness). The biofilm was cultivated for a month using half municipal wastewater and half PBS solution.
Reference
1 S. Brunauer, P.H. Emmett, E. Teller, Adsorption of Gases in Multimolecular Layers, J. Am. Chem. Soc. 60 (1938) 309-319.