

Supplementary Material

A Novel Bismuth-Chitosan Nanocomposite Sensor for Simultaneous Detection of Pb(II), Cd(II) and Zn(II) in Wastewater

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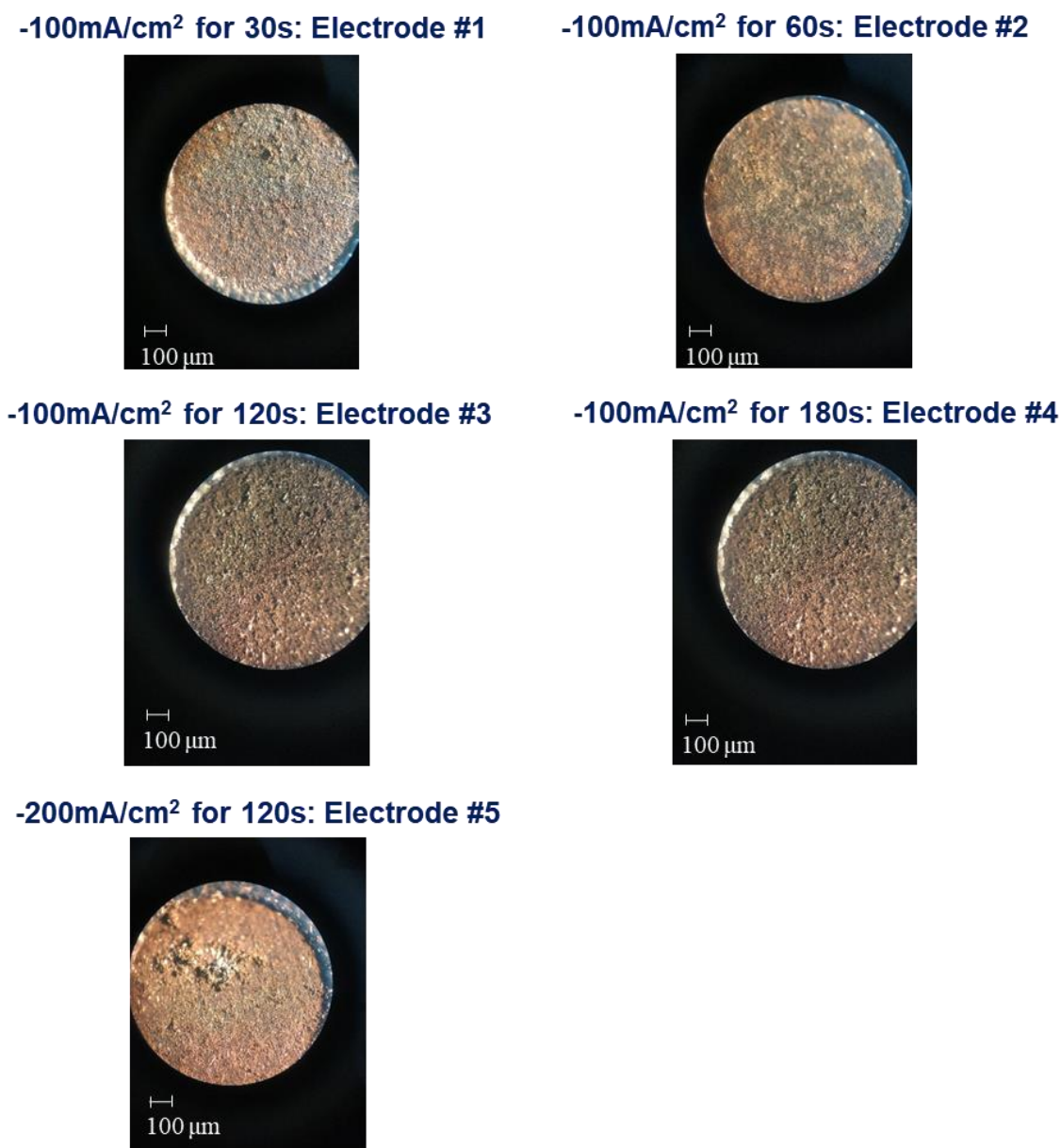


Figure S1. Surface images ($\times 100$ optical microscope) of Bi-chitosan nanocomposite films prepared under different electrochemical deposition conditions.

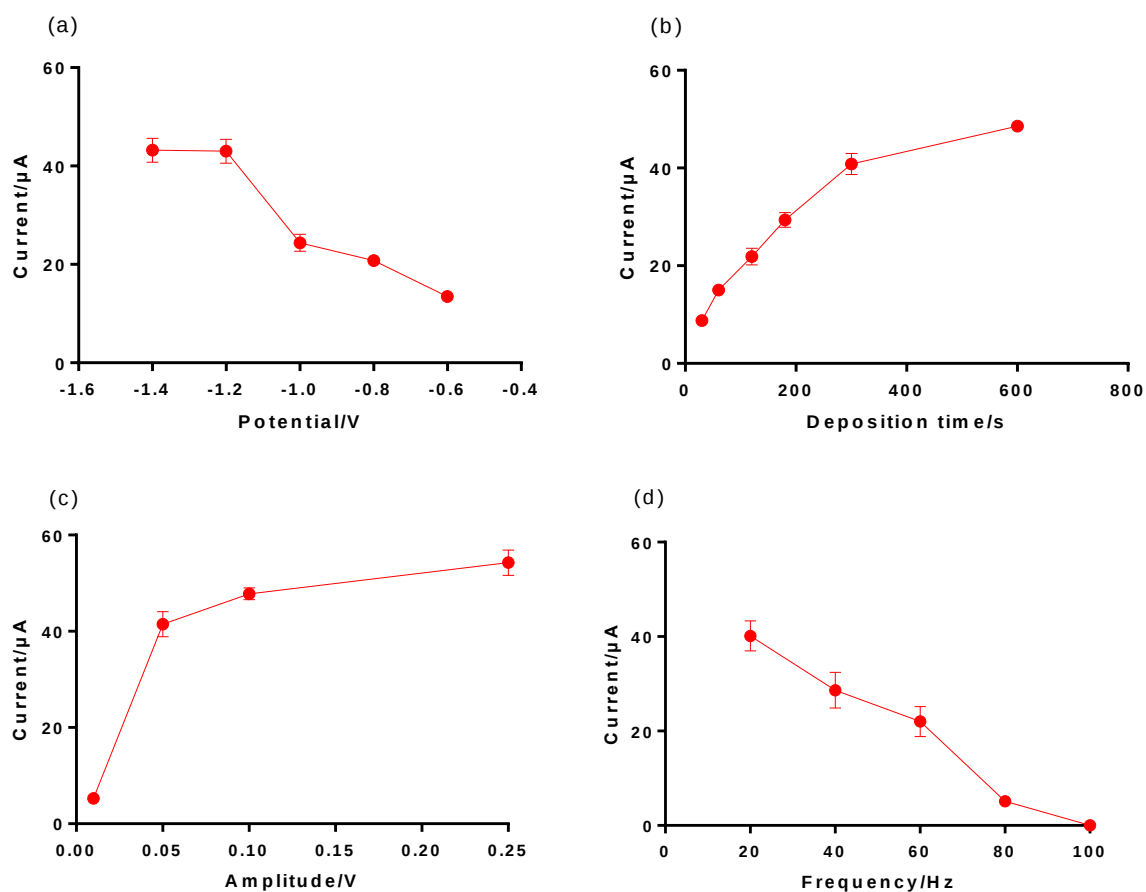
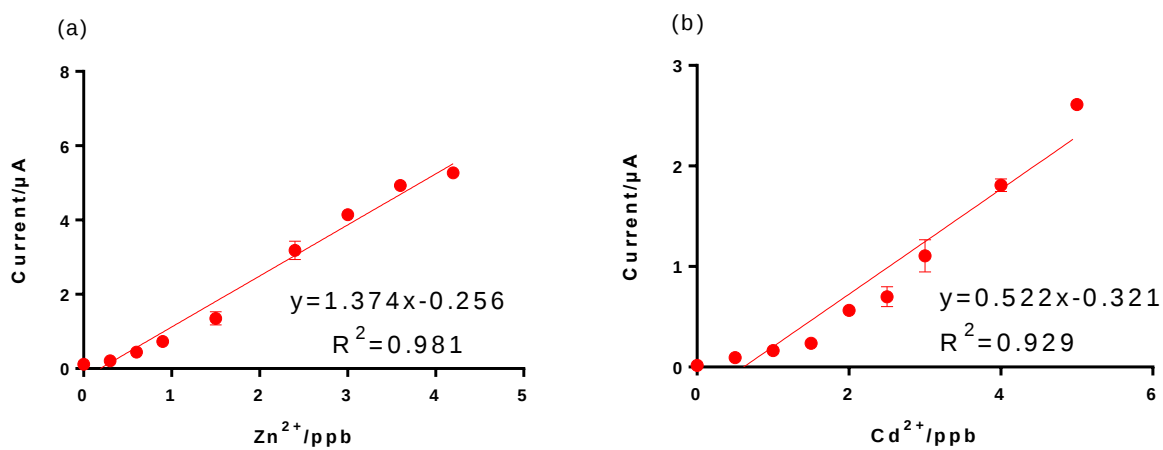


Figure S2. Effect of (a) deposition potential, (b) deposition time, (c) amplitude, and (d) frequency on the anodic stripping peak current of Pb^{2+} using a Bi/chitosan-coated sensor. Pb^{2+} concentration is 10 ppb (0.1 M AcB at pH 4.5).



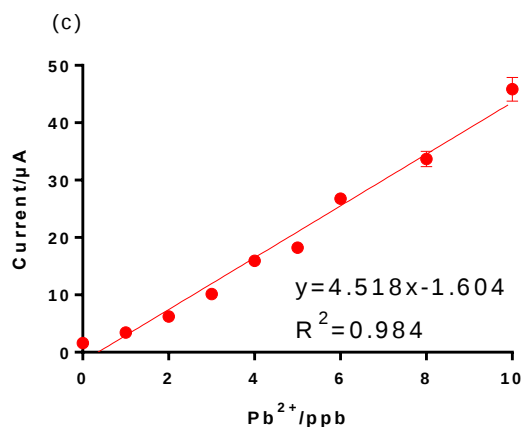


Figure S3. Corresponding SWASV calibration curves of (a) Zn^{2+} , (b) Cd^{2+} and (c) Pb^{2+} in 0.1 M AcB (pH 4.5). Deposition time is 300 s with a -1.2V deposition potential, 0.004 V potential step, 0.05 V amplitude, and 20 Hz frequency.

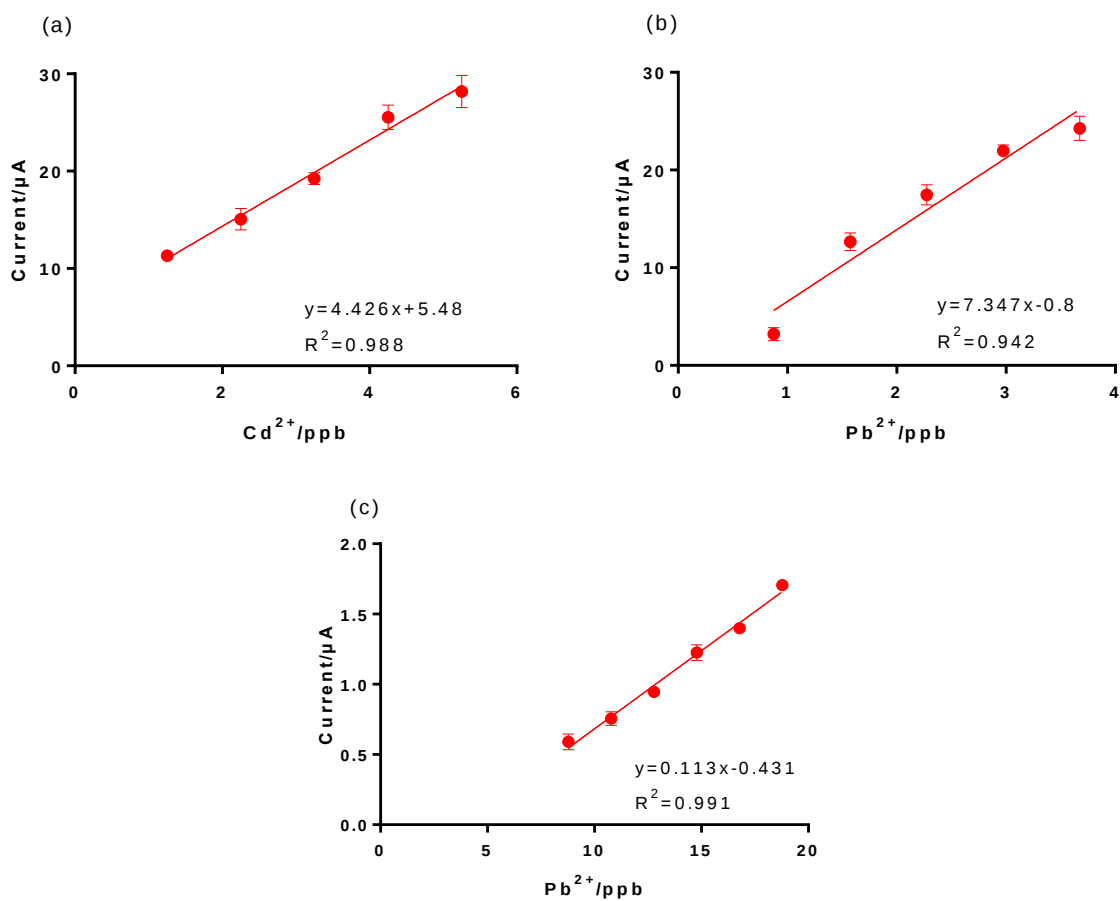


Figure S4. SWASV calibration curves of various (a) Cd^{2+} and (b) Pb^{2+} concentrations in the mining wastewater sample and (c) Pb^{2+} concentrations in the soil leachate.

Table S1. Heavy metal ion concentrations in mining wastewater and soil leachate samples

Sample	Heavy metal concentration (ppm)				
	Zn ²⁺	Cd ²⁺	Pb ²⁺	Cu ²⁺	As ³⁺
Mining wastewater	11.5	0.1	0.07	10.5	0.3
Soil leachate	439.2	8.4	394.4	38.1	338.5

Table S2. Thickness of the Bi-chitosan nanocomposite films with different electrodeposition times and current densities.

Supplementary Material	Supplementary Material	Supplementary Material
1	30 s, -100 mA/cm ⁻²	5.2
2	60 s, -100 mA/cm ⁻²	7.6
3	120 s, -100mA/cm ⁻²	9.3
4	180 s, -100mA/cm ⁻²	10.1
5	120 s, -200mA/cm ⁻²	11.5



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