Supplementary Material (ESI) for Journal of Materials Chemistry

Supporting Information

Enhanced electrochemical detection of heavy metals at heated graphite nanoparticles screen-printed electrodes

Gemma Aragay,[a,b] *Josefina Pons,*[b] *Arben Merkoçi*[a,c]

[a]Nanobioelectronics & Biosensors Group, Institut Català de Nanotecnologia, 08193, Bellaterra, Spain. Fax: 34 935813797.

[b]Department of Chemistry, Universitat Autònoma de Barcelona, 08193, Bellaterra, Spain. Fax: 34 935813101.

[c]ICREA, Barcelona, Spain.

E-mail: arben.merkoci.icn@uab.cat.

Table SI1. Figures of merit for carbon nanoparticles based SPE at room temperature for the Pb^{2+} detection in seawater.

Parameters	***Carbon nanoparticles-based SPE***
Regression equation/ Correlation coeficient (r^2)	y = 0.0087x – 0.007 / 0.9875
Coefficient of variation (CV) / % (10 measurements)	9.9
Limit of detection (LOD) / μgL^{-1}	3.00
Limit of quantification (LOQ) / μgL^{-1}	8.14
Repeatibility (σ^2 and σ^6)	For 20 ppb : $8.94 \cdot 10^{-3}$ For 80 ppb : $1.18 \cdot 10^{-2}$
Lowest detectable change (σ^2 and $\sigma^{6)}$	For 20 ppb : $2.68 \cdot 10^{-2}$ For 80 ppb: $3.56 \cdot 10^{-2}$

Figure SI1. (a) TEM images of the graphite ink used for the development of the carbon nanoparticles based SPE after heating it at 40ºC (a.1) – (a.4). (b) SEM images of the working electrode surface at room temperature (b.1) and after heating at 40 ºC (b.2).

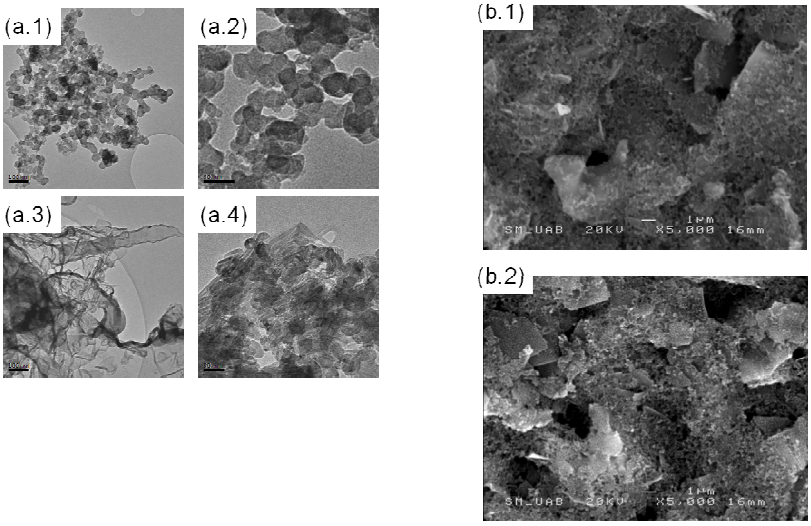


Figure SI2.(a) Optimization for the deposition time (1-150 s); (b) Optimization for the conditioning time (0-120 s); (c) Optimization for the conditioning potential (-0.3 – 0.3 V); (d) Frequency optimization (8-100 Hz); (e) Scan rate optimization (1-10 mVs^{-1}).

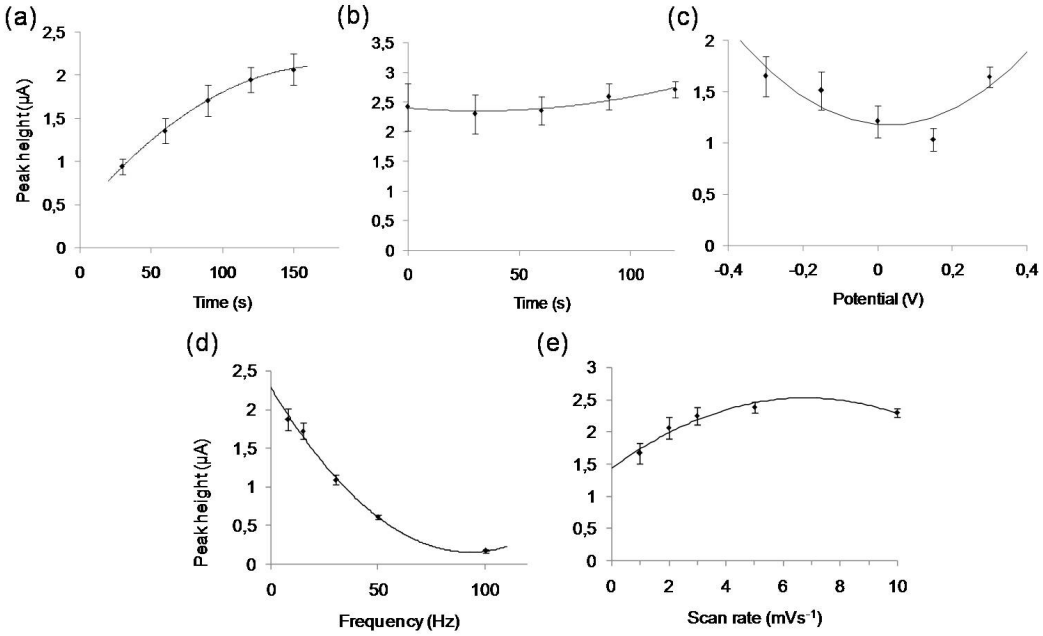


Figure SI3. Single calibration curves for Carbon nanoparticles based SPE at room temperature. (a) Pb^{2+} calibration curve; (b) Cd^{2+} calibration curve; (c) Cu^{2+} calibration curve; (d) Hg^{2+} calibration curve.

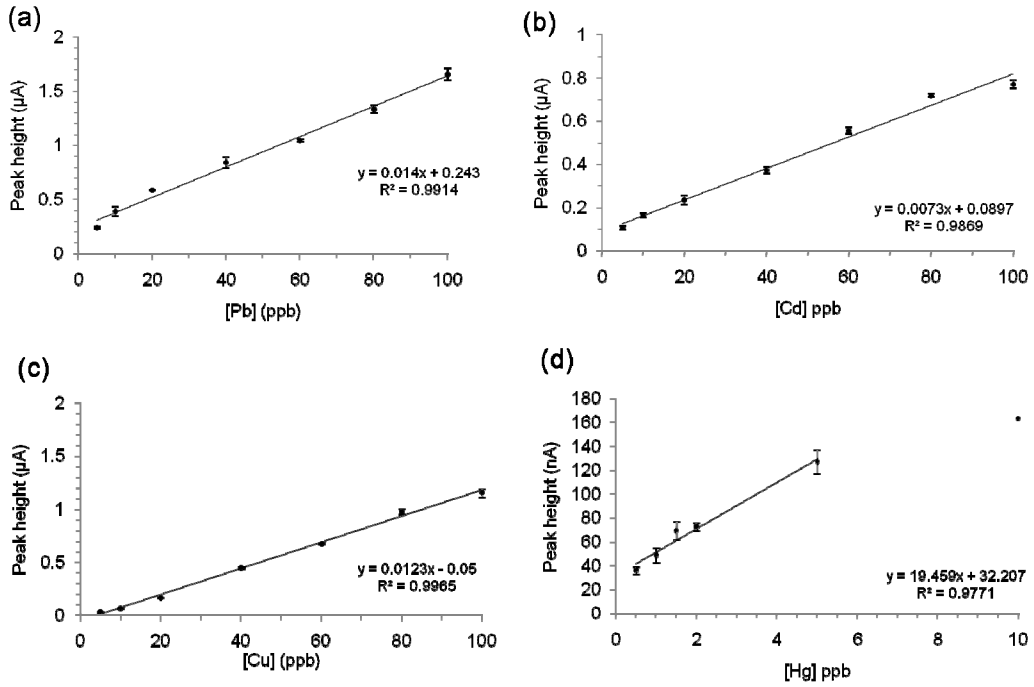
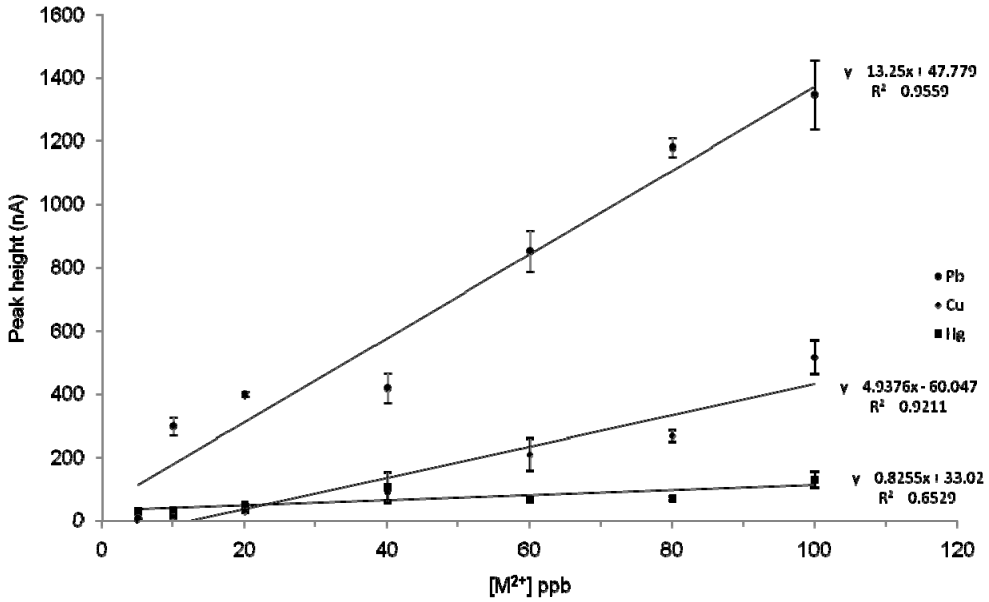


Figure SI4. (a) Multidetection calibration curves for carbon nanoparticles based SPE at room temperature. Range from 5 to 100 ppb. (b) Multidetection calibration curves for carbon microparticles based SPE at room temperature. Range from 20 to 100 ppb.

(a)



(b)

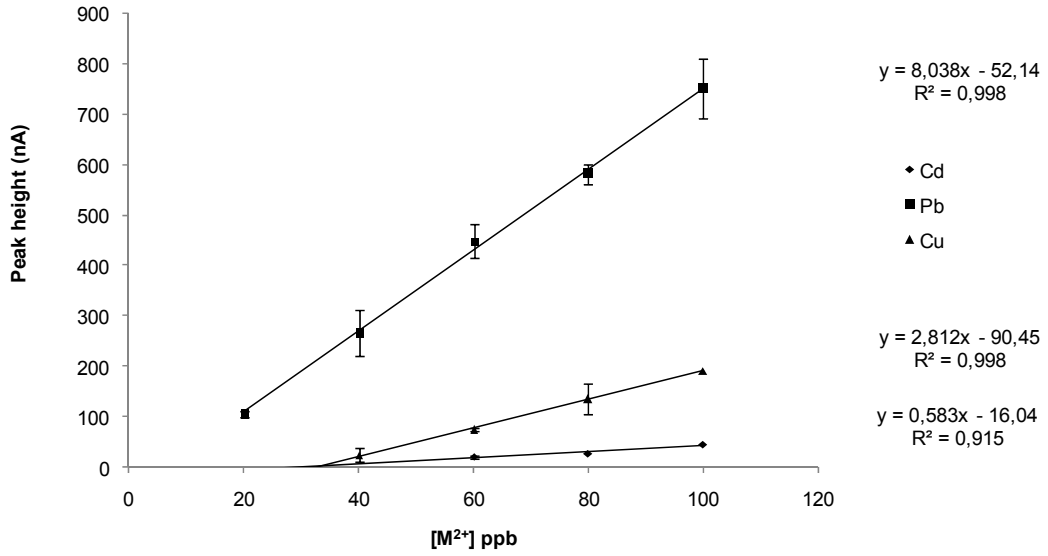


Figure SI5. Microanalysis of the different areas of a carbon nanoparticles based SPE after deposition of heavy metals at room temperature.

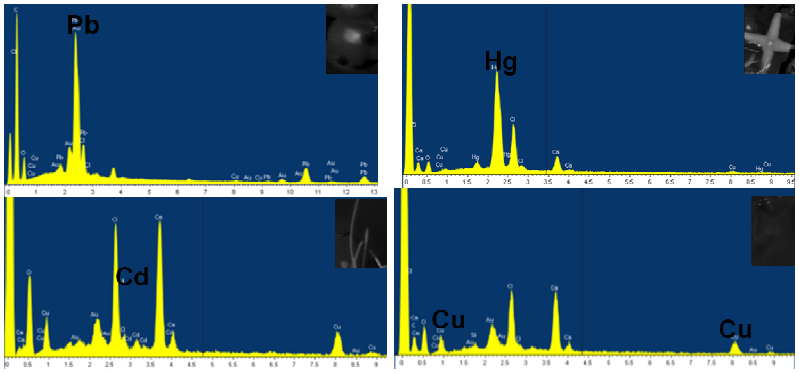


Figure SI6. Increase on the peak height of Cd^{2+}, Pb^{2+} and Cu^{2+}, upon the increase of temperature using a carbon microparticle based SPE.

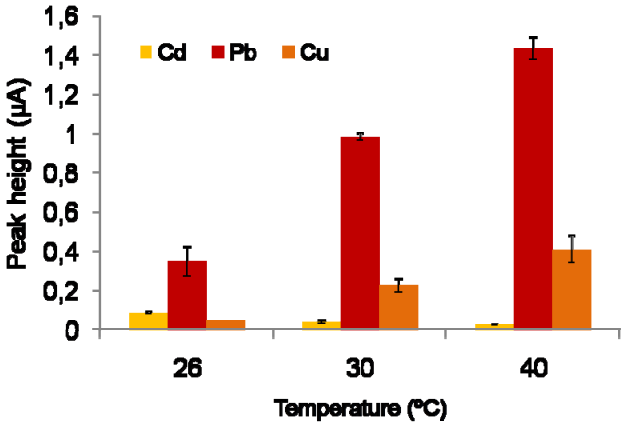


Figure SI7. Long-term stability for carbon nanoparticles based SPEs during five weeks using a 100 μgL^{-1} Pb^{2+} solution in seawater at room temperature.