Electronic Supplementary Material (ESI) for Analytical Methods.

Journal Name RSCPublishing

ARTICLE

Cite this: DOI: 10.1039/x0xx00000x

A versatile and robust electrochemical flow cell with a boron-doped diamond electrode for simultaneous determination of Zn^{2+} and Pb^{2+} ions in water samples

Vagner Bezerra dos Santos[a,*], Elson Luiz Fava[a], Osmundo Dantas Pessoa-Neto[a], Silmara Rossana Bianchi[b], Ronaldo Censi Faria[a] and Orlando Fatibello-Filho[a]

Received 00th January 2012,
Accepted 00th January 2012

DOI: 10.1039/x0xx00000x

www.rsc.org/

Electronic Supplementary Information (ESI)

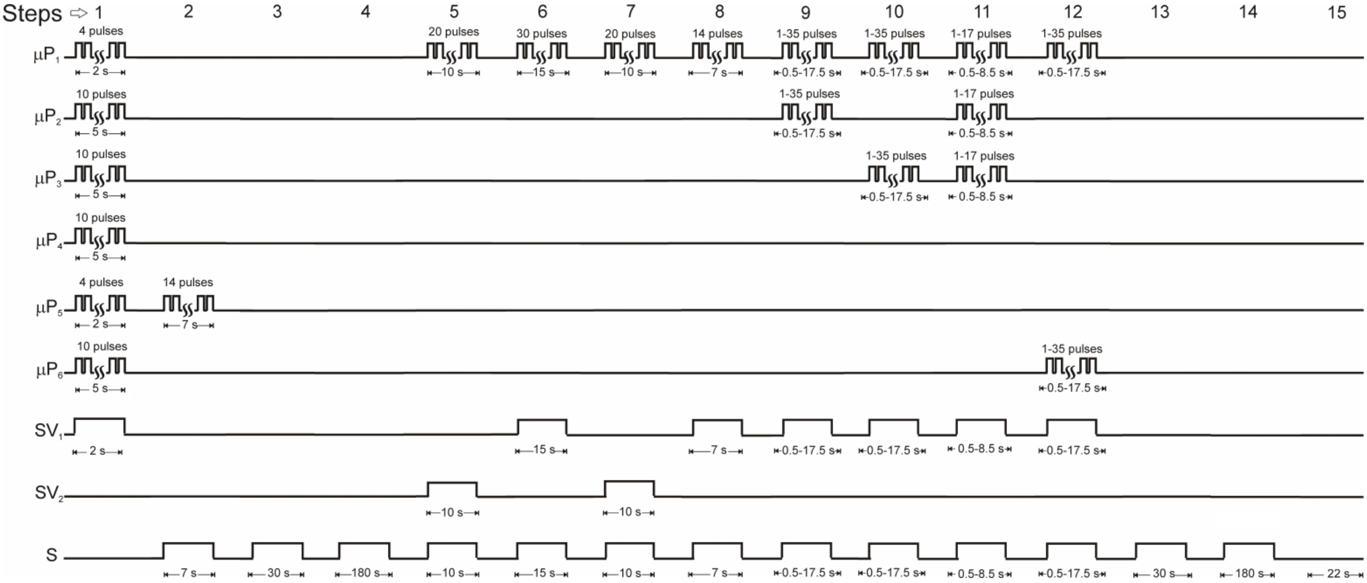

Fig. S1. Flow diagram for the FBA-DPASV. The symbols between the pulses represent a group of pulses applied at a time interval. The steps are described as: filling the channels (1), addiction of H_2SO_4 solution (2), temperature control (3), APT and CPT (4), drainage/air (5), cleaning (6), drainage/air (7), addition of blank (8), addition of Zn^{2+} (9) and Pb^{2+} solutions (10), simultaneous addition (Zn^{2+}/Pb^{2+}) (11), addition of sample (12), temperature control (13), preconcentration (14), and measurements/DPASV (15).

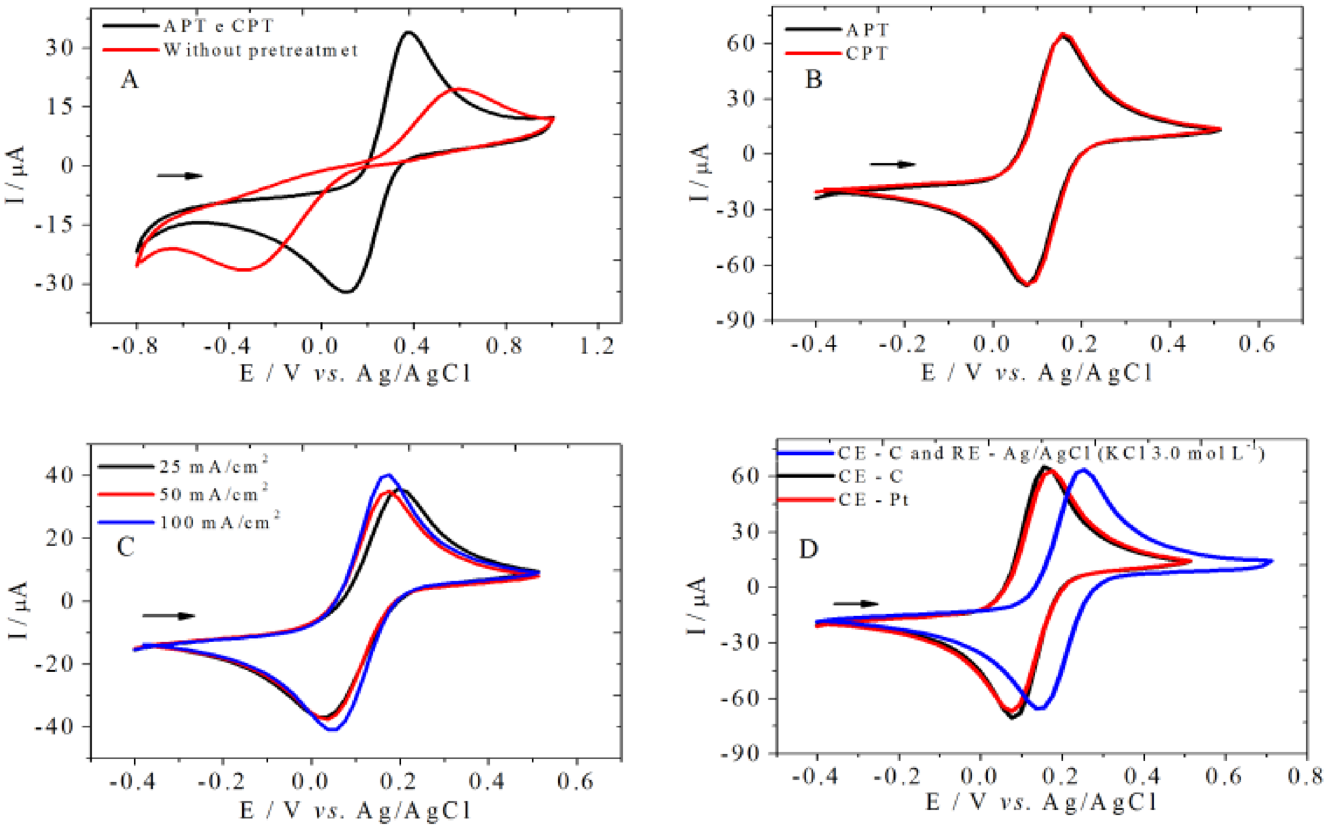

Fig. S2. Cyclic voltammograms of SPE-BDD without pretreatment compared to APT and CPT (A). Comparison between APT and CPT with the same current density applied for 60 s (B). Studies of different current densities for CPT during 120 s (C). Performance of the CE based on graphite carbon (CE-C) embedded into the SPE-BDD compared to an external CE of platinum (CE-Pt), and an external RE (Ag/AgCl, 3.0 mol L^{-1} KCl) compared to the pseudo-RE of the SPE-BDD (D).

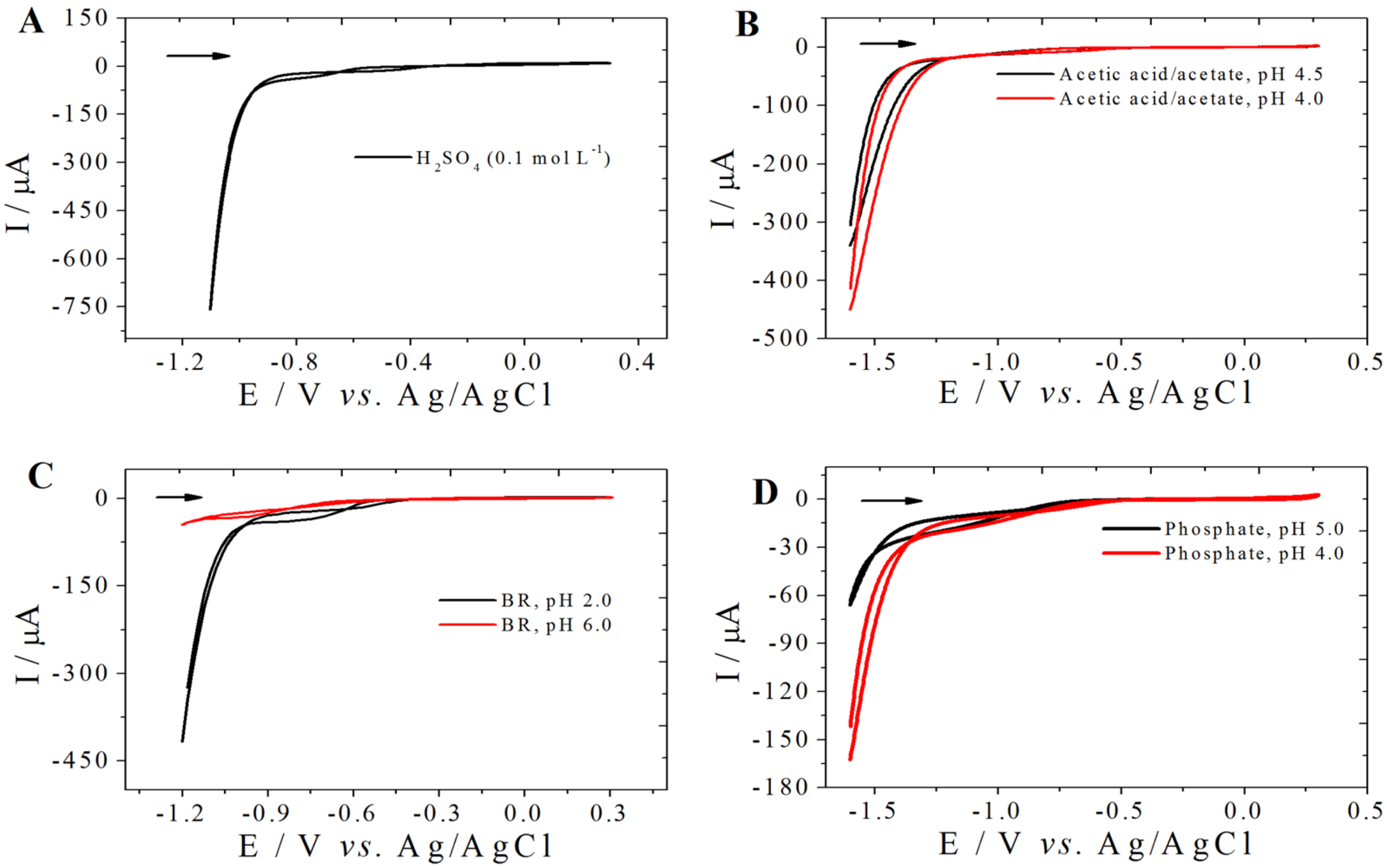

Fig. S3. Supporting electrolytes evaluated by cyclic voltammetry. Solutions of 0.1 mol L^{-1} H_2SO_4 (A). Acetic acid/acetate buffer solution (0.2 mol L^{-1}, pH 4.0 and 4.5) (B). Britton-Robinson (BR) buffer (0.04 mol L^{-1}, pH 2.0, and 6.0) (C). Phosphate buffer solutions (0.2 mol L^{-1}, pH 4.0 and 5.0) (D). Potential scan rate of 50 mV s^{-1}.

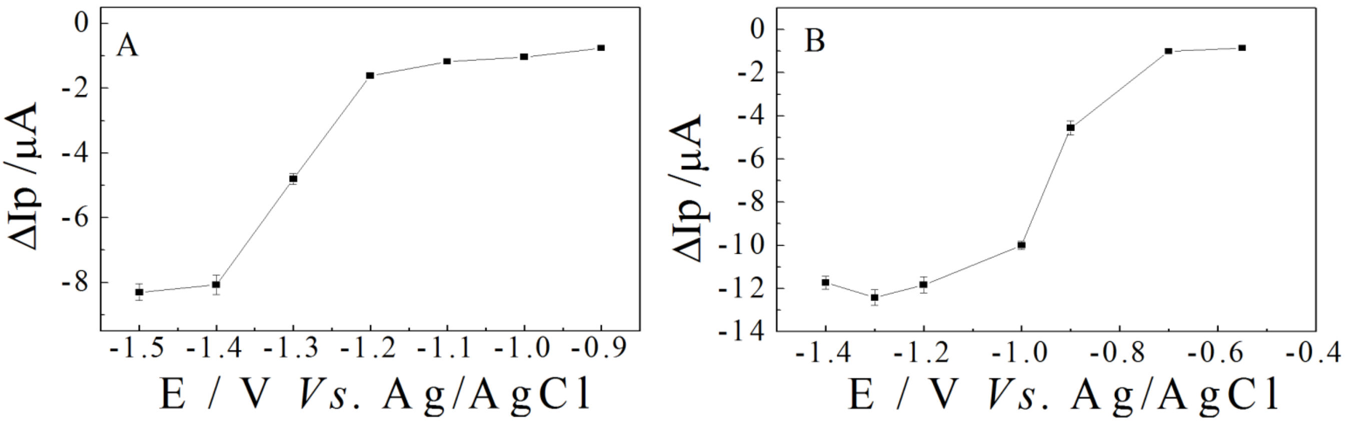

Fig. S4. Hydrodynamic evaluation of the potential for reduction of 2000 µg L^{-1} of Zn^{2+} (A) and 500 µg L^{-1} Pb^{2+} (B). Carrier solution used was 0.2 mol L^{-1} acetic acid/ acetate buffer, pH 4.0 at a flow rate of 50 µL s^{-1}. Pulse duration of 100 ms.

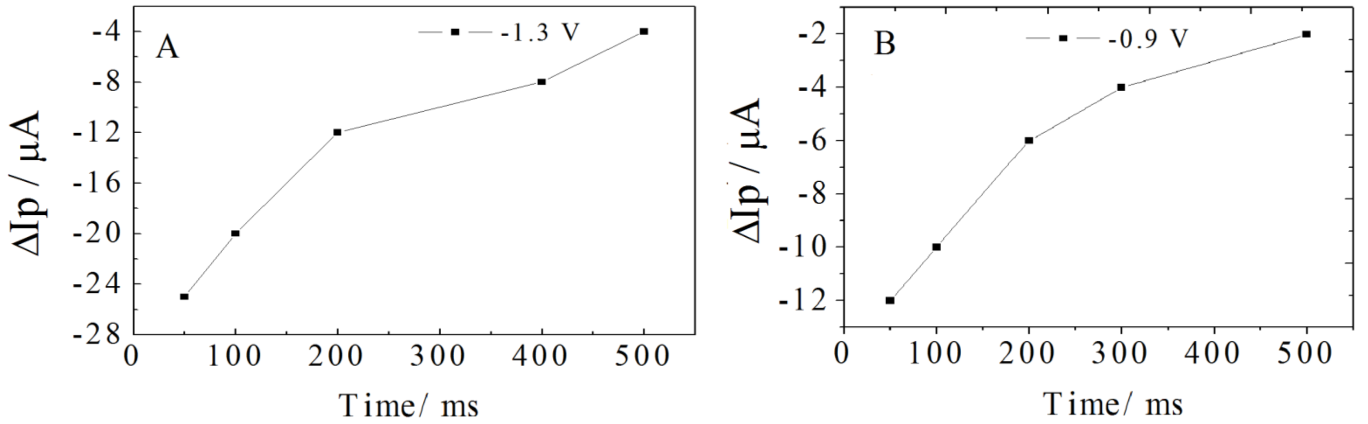

Fig. S5. Hydrodynamic studies to evaluate the pulse time applied for -1.3 V (A) using 4000 µg L^{-1} of Zn^{2+} and - 0.9 V (B) employing 500 µg L^{-1} of Pb^{2+} solution with 0.2 mol L^{-1} acetic acid/acetate buffer solution, pH 4.0 as carrier solution at a flow rate of 50 µL s^{-1}.

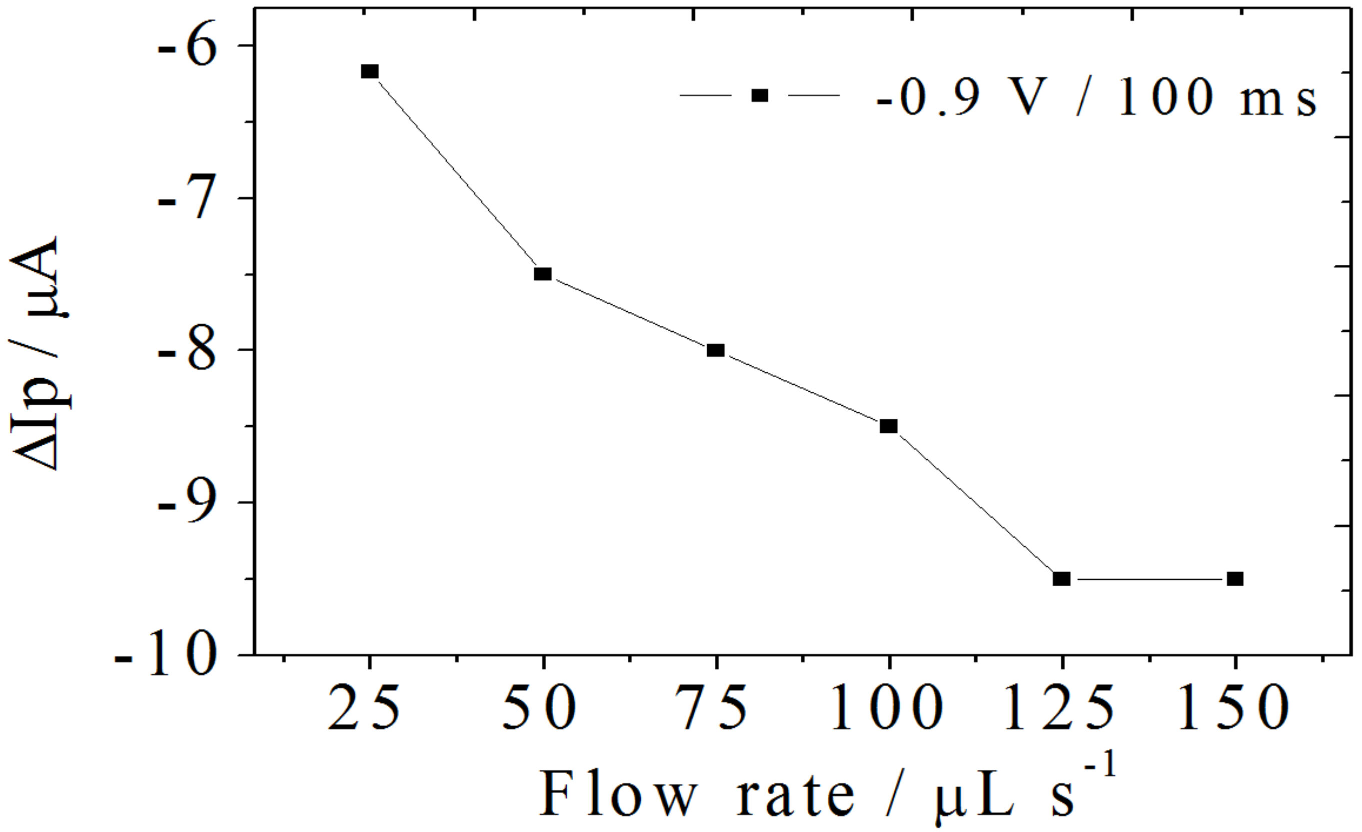

Fig. S6. Influence of the flow rate of the carrier solution based on acetic acid buffer pH 4.0 on the MPA signal for 500 μg L^{-1} of Pb^{2+} injected to generate each transient signal obtained applying – 0.9 V/100 ms.

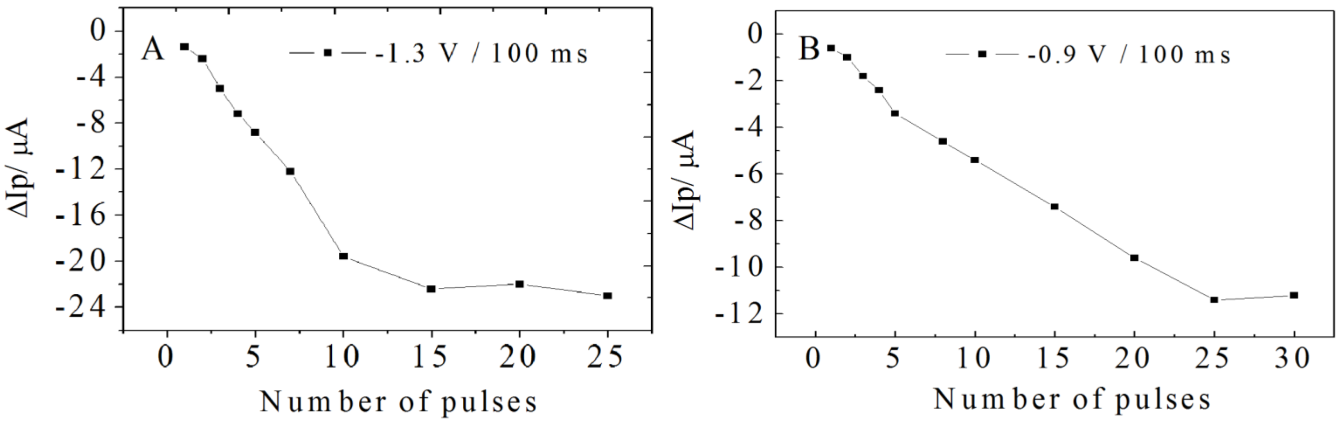

Fig. S7. Studies of the size of the sampling volume injected into the EFC, which is proportional to the number of pulses applied in each μP used in the MCFA system with MPA for 4000 μg L^{-1} stock solution Zn^{2+} (A) and 500 μg L^{-1} stock solution of Pb^{2+} (B). The flow rate employed was 50 μL s^{-1}.

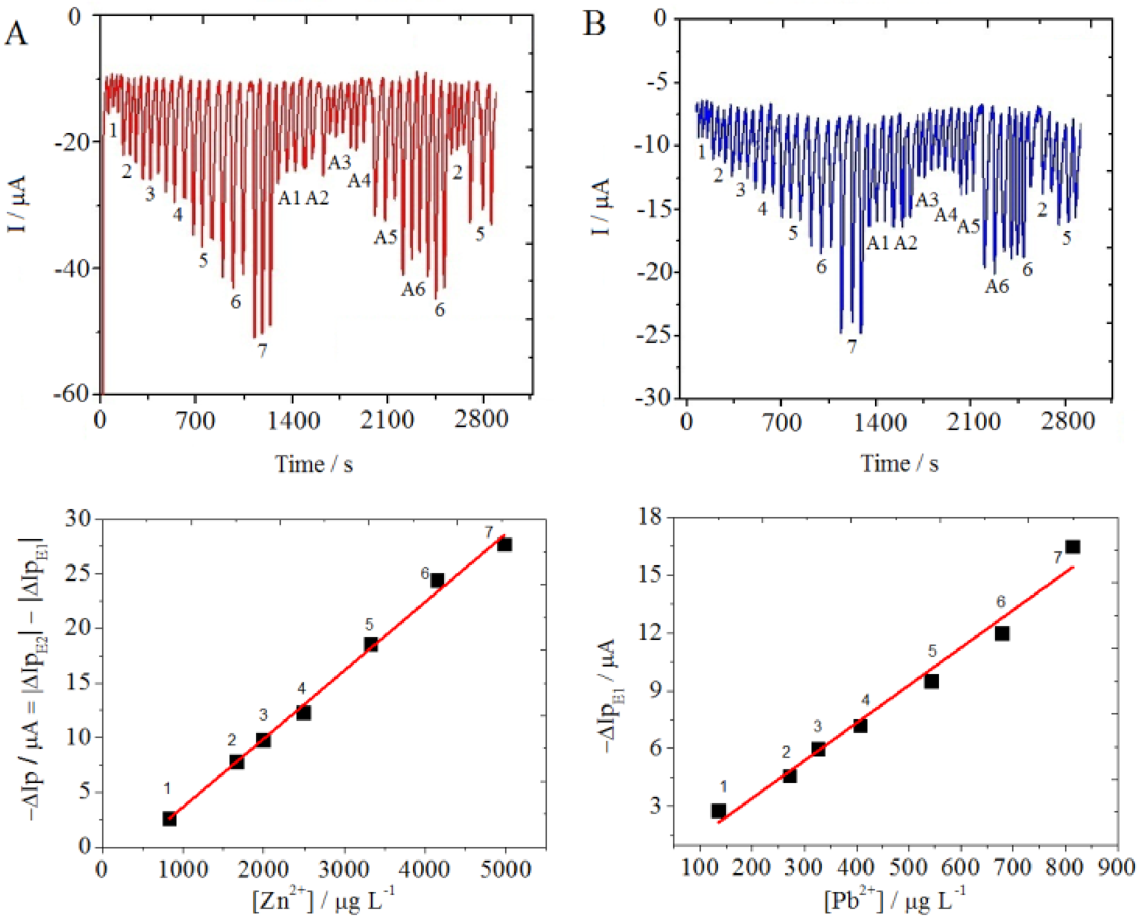

Fig. S8. Simultaneous calibration curves of Zn^{2+} and Pb^{2+} employing the SPE-BDD with MCFA-MPA. A carrier solution of acetic acid/acetate buffer, pH 4.0, at a flow rate of 50 µL s^{-1} was used. The potential pulses employed were -1.4 V/50 ms and -1.0 V/50 ms to determine Zn^{2+} and Pb^{2+} respectively. Stock solutions of 10,000 µg L^{-1} and 2000 µg L^{-1} for Zn^{2+} and Pb^{2+} ions were employed.