

Figure 1: Scheme of a screen-printed electrode.

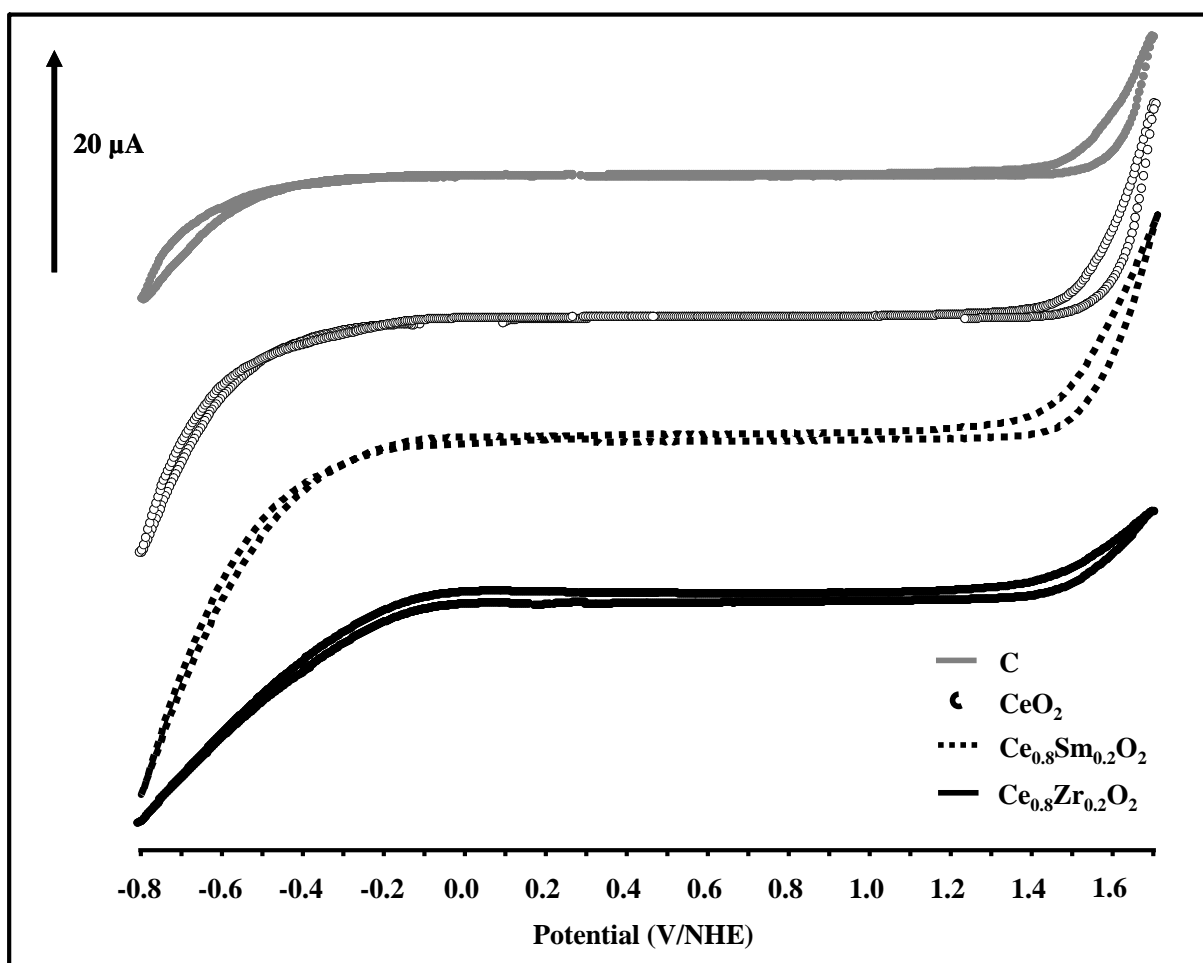


Figure 2: C-, CeO<sub>2</sub>-, Ce<sub>0.8</sub>Sm<sub>0.2</sub>O<sub>2</sub>- and Ce<sub>0.8</sub>Zr<sub>0.2</sub>O<sub>2</sub>-based SPEs cyclic voltammograms recorded in NaCl 0.1 mol L<sup>-1</sup>. Experimental conditions: CV between -0.8V/NHE and +1.7V/NHE. Scan rate: 0.05 V s<sup>-1</sup>, 5 electrodes.

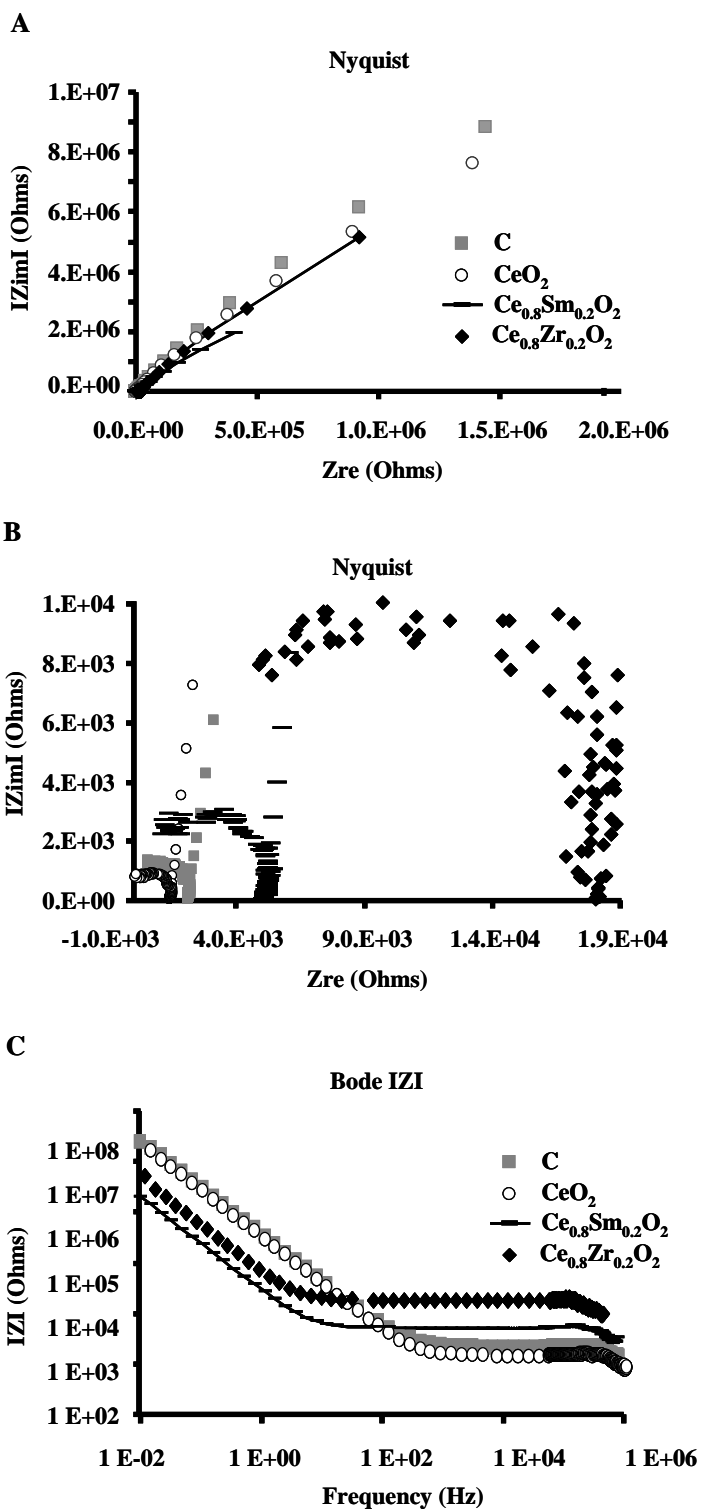


Figure 3: A: EIS diagrams in Nyquist mode, B: EIS diagrams in Nyquist mode with magnification, C: EIS diagrams in Bode mode, obtained with C- and CeO<sub>2</sub>-based SPEs in aerated NaCl 0.1 mol L<sup>-1</sup>. Experimental conditions: frequency range 10 Hz -1 MHz at +0.7V/NHE, 5 electrodes.

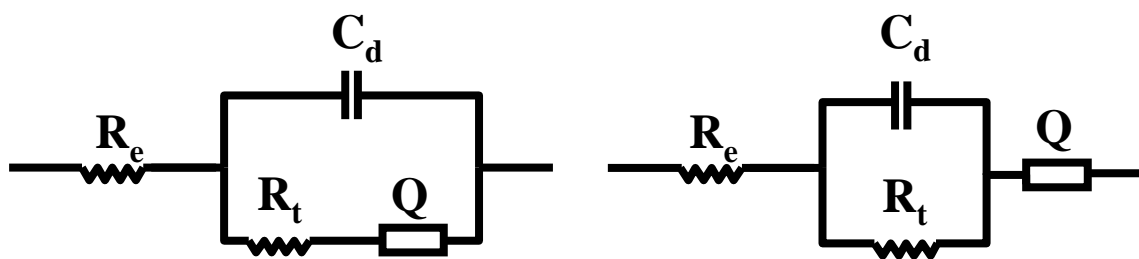


Figure 4: Two indiscernible electrical equivalent circuits obtained from EIS diagram conducted with C- and  $\text{CeO}_2$ -based SPEs in  $\text{NaCl}$  ( $0.1 \text{ mol L}^{-1}$ ). Experimental conditions: frequency range 10 Hz -1 MHz at + 0.7V/NHE, 5 electrodes.

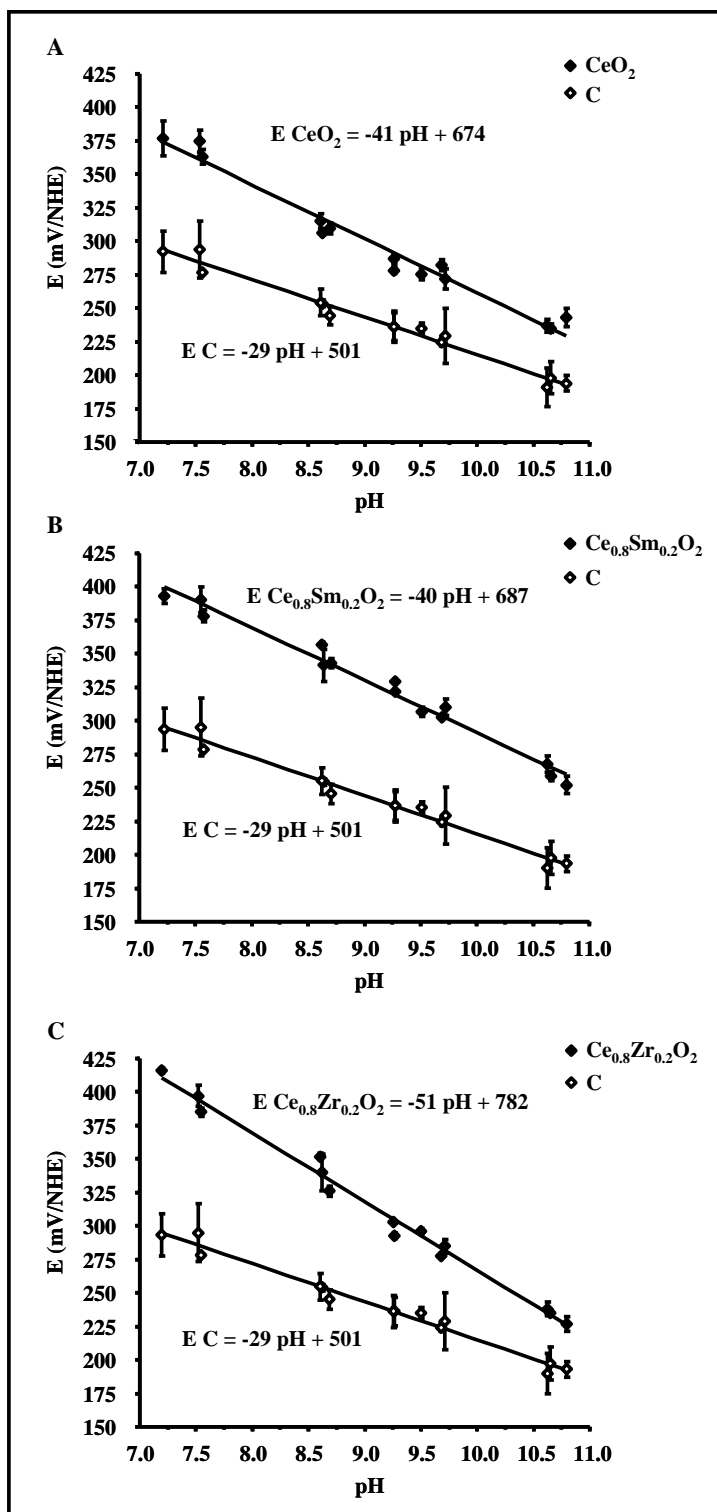


Figure 5: Comparison between C- and (A)  $\text{CeO}_2$ -, (B)  $\text{Ce}_{0.8}\text{Sm}_{0.2}\text{O}_2$ - and (C)  $\text{Ce}_{0.8}\text{Zr}_{0.2}\text{O}_2$ - based SPEs potential (mV/NHE) versus pH in  $\text{NH}_4\text{Cl}/\text{NH}_3$  buffer solutions at  $25^\circ\text{C}$ .

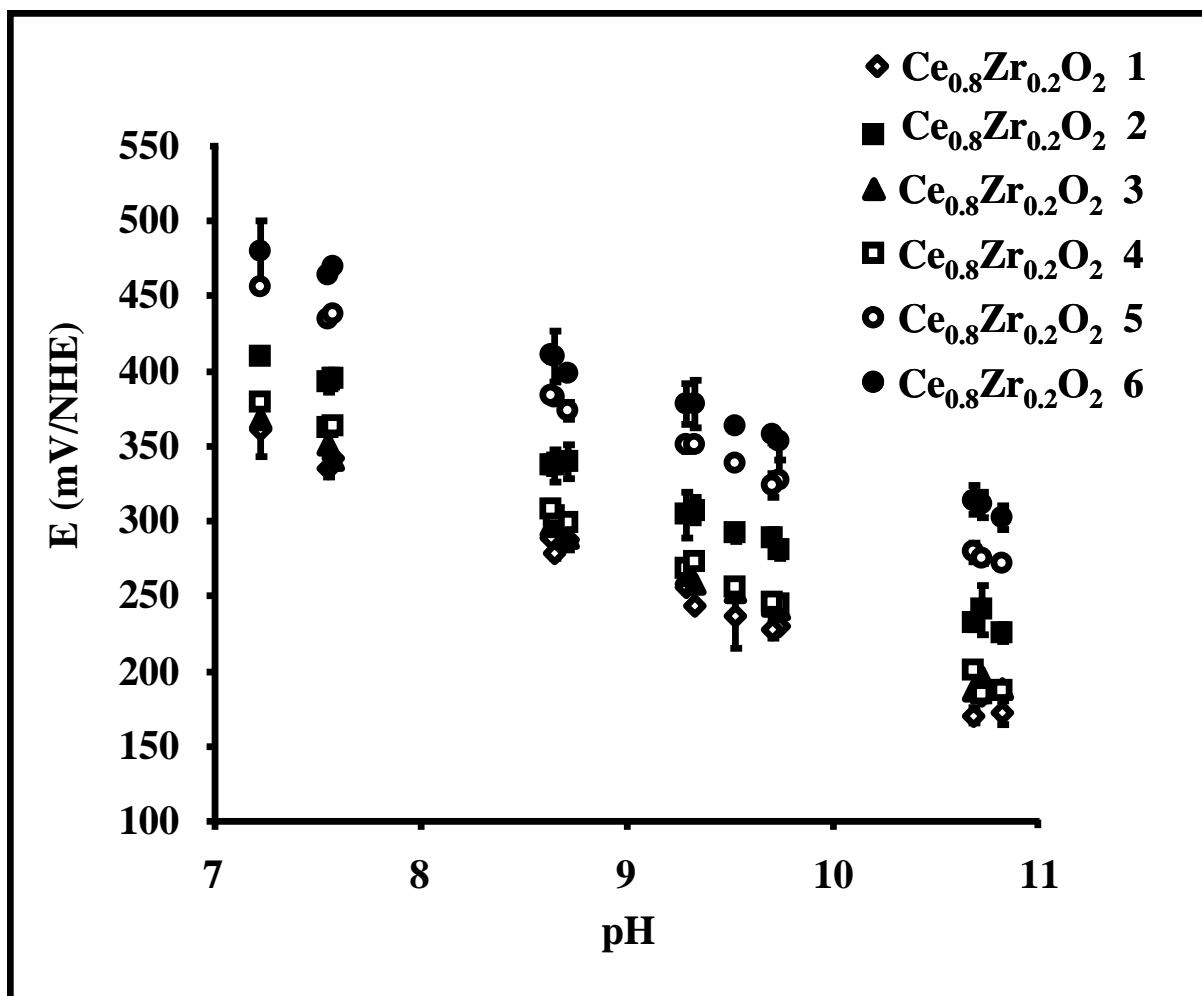


Figure 6: Typical calibration curves obtained in  $\text{NH}_4\text{Cl}/\text{NH}_3$  buffer solutions with  $\text{Ce}_{0.8}\text{Zr}_{0.2}\text{O}_2$ -based SPEs at  $25^\circ\text{C}$  ( $n = 6$  electrodes).

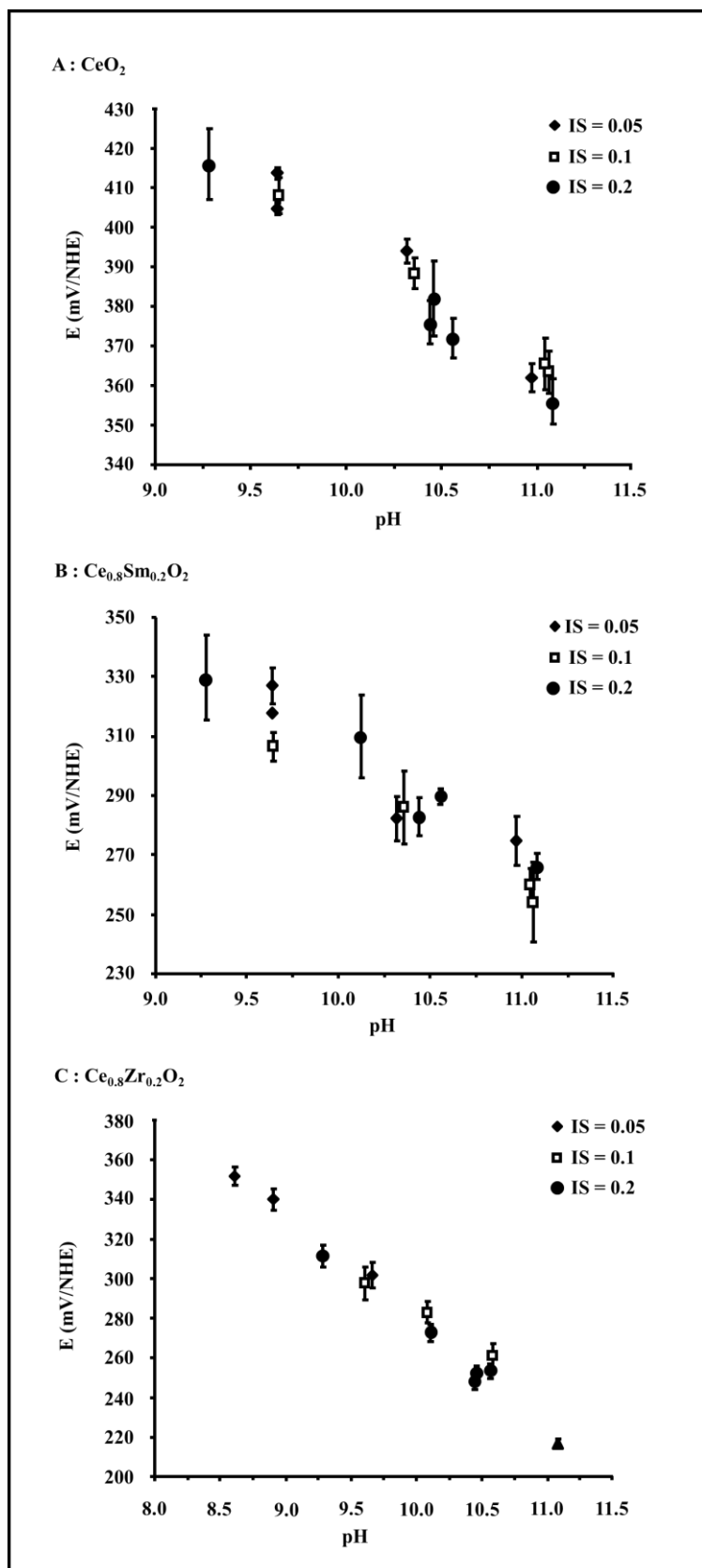


Figure 7: Evolution of CeO<sub>2</sub>-based SPEs potential (mV/NHE) according to pH as well as ionic strength. NaHCO<sub>3</sub>/Na<sub>2</sub>CO<sub>3</sub> buffer solutions.

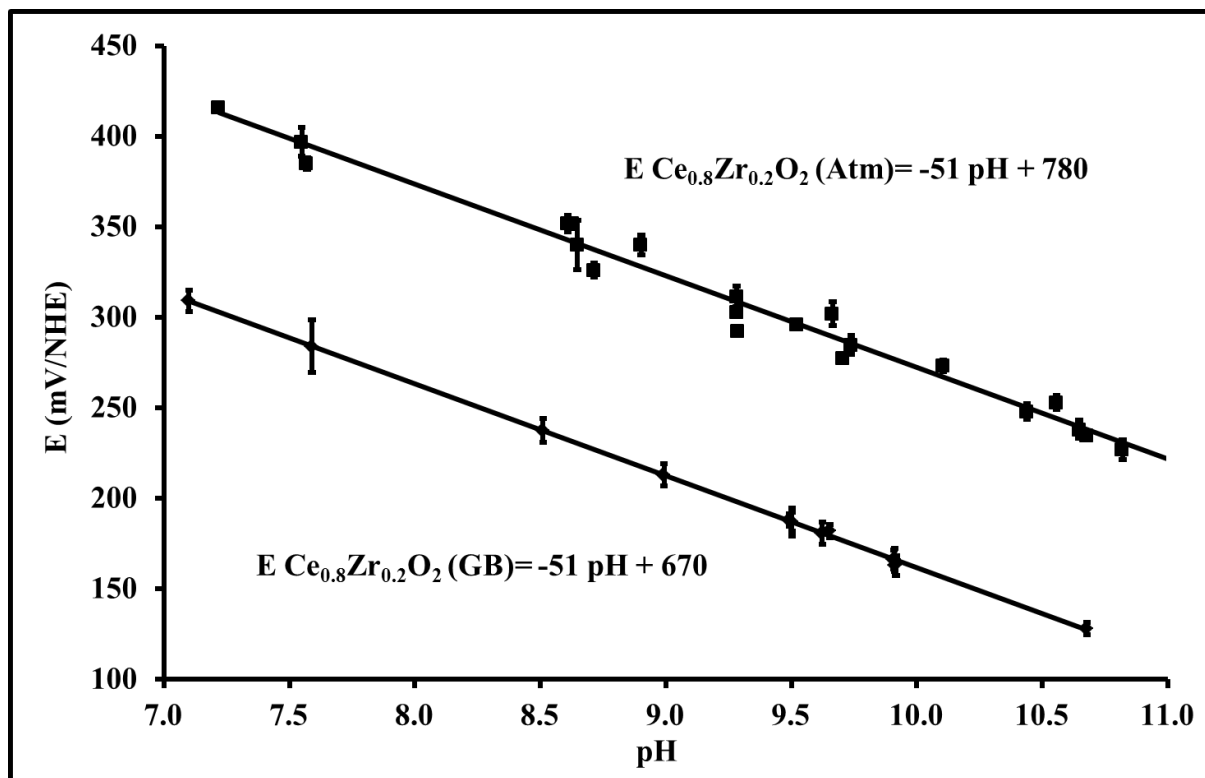


Figure 8: Ce<sub>0.8</sub>Zr<sub>0.2</sub>O<sub>2</sub>-based SPEs calibration curve obtained at 25°C under atmospheric oxygen saturation (Atm) and anoxic conditions carried out in a glove box (GB). Data include measurements conducted in NH<sub>4</sub>Cl/NH<sub>3</sub> and NaHCO<sub>3</sub>/Na<sub>2</sub>CO<sub>3</sub> buffer solutions.



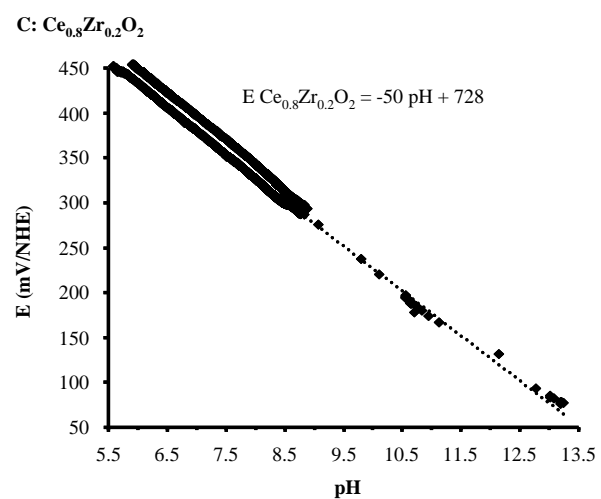
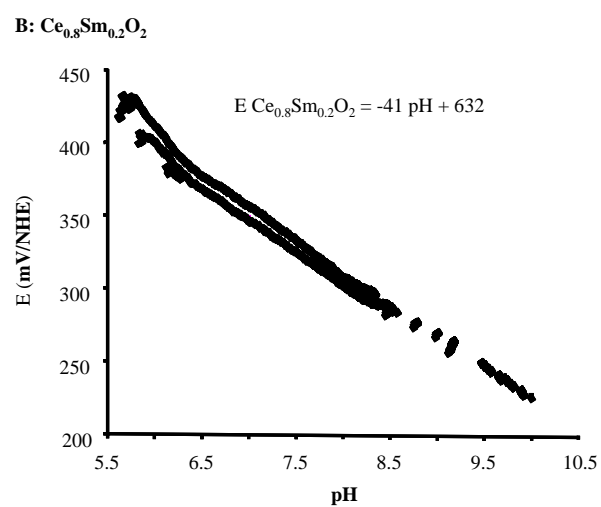
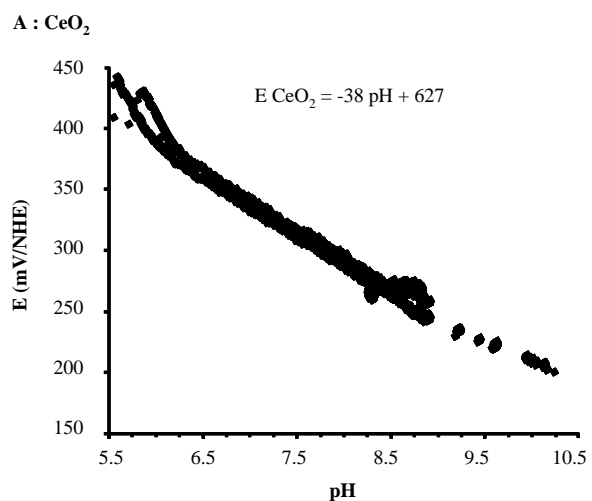


Figure 9: Potential response of CeO<sub>2</sub>-, Ce<sub>0.8</sub>Sm<sub>0.2</sub>O<sub>2</sub>- and Ce<sub>0.8</sub>Zr<sub>0.2</sub>O<sub>2</sub>-based SPEs obtained at 25°C in continuous pH values in NaCl (0.1 mol L<sup>-1</sup>) spiked with a NaHCO<sub>3</sub>/Na<sub>2</sub>CO<sub>3</sub> buffer (pH 10.5, ionic strength 0.2). The experiment was extended to pH 13.2 with NaOH (1 mol L<sup>-1</sup>) for Ce<sub>0.8</sub>Zr<sub>0.2</sub>O<sub>2</sub>-based SPEs.