Supporting Information

Ultrasensitive Detection of Carcinogenic Chromium (VI) Species Below the WHO Limit Using a $LaCeO_3$/Carbon Black Screen-Printed Electrode in Batch Injection Analysis

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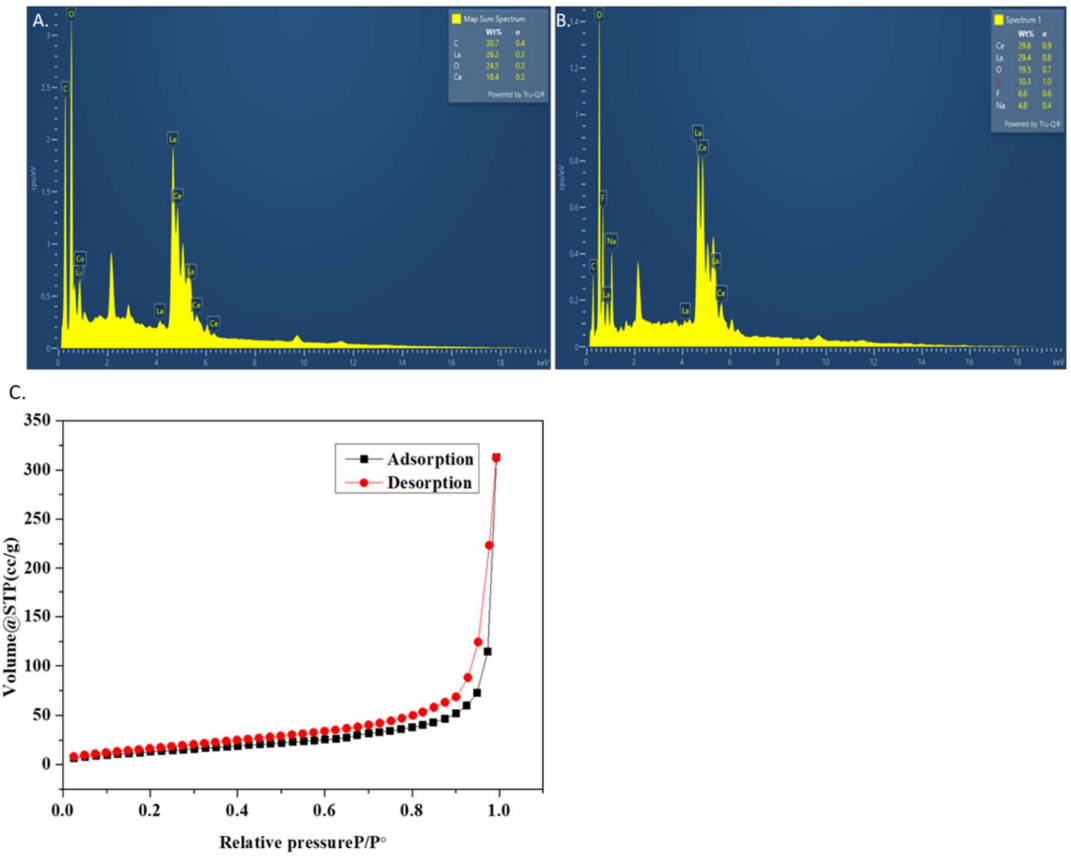

Figure S1. A) EDAX analysis of synthesized $LaCeO_3$. B) SPE modified with CB@$LaCeO_3$ and C) BET Analysis of $LaCeO_3$.

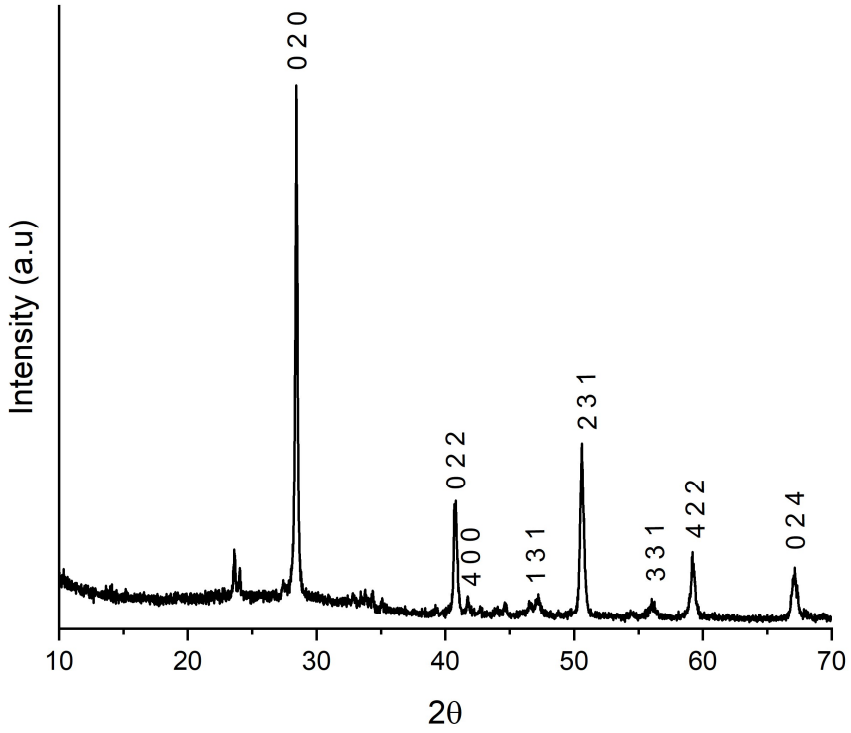

Figure S2. Powder XRD pattern of synthesized $BaCeO_3$

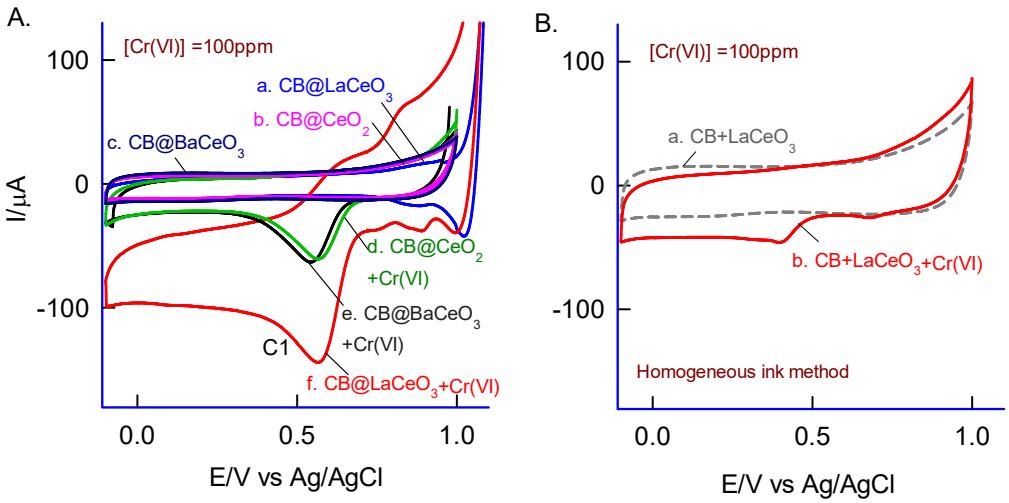

Figure S3. A) CV responses for catalytic reduction of Cr(VI) (curve a, b and c) using different modified SPEs along with their control experiments in absence of Cr(VI) (curve d, e and f). B) Control experiment with homogenous ink drop-casted on electrode surface to obtain SPE/CB+$LaCeO_3$ without (curve a) and with Cr(VI) (curve b).

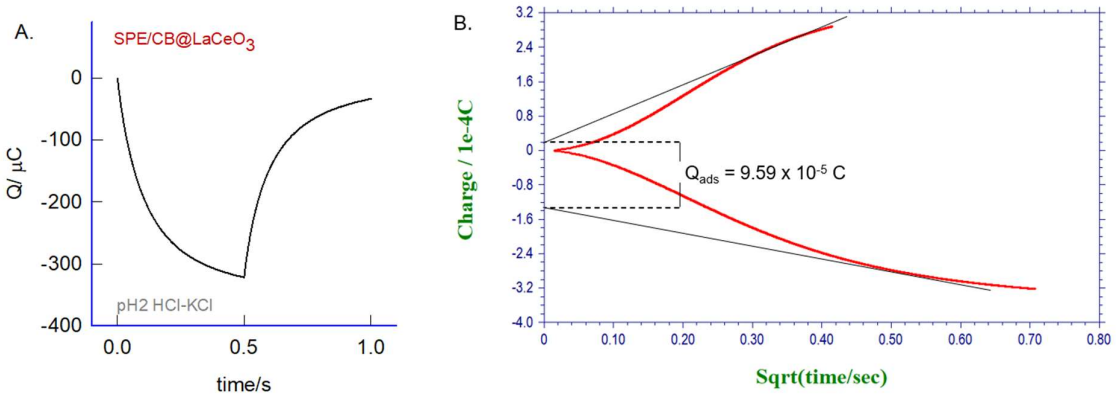

Figure S4. A) Chronocoulometric experiment with SPE/CB@$LaCeO_3$ in the potential window 0.8 to 0.0V vs Ag/AgCl. B) Charge *vs* root of time response corresponding to A.

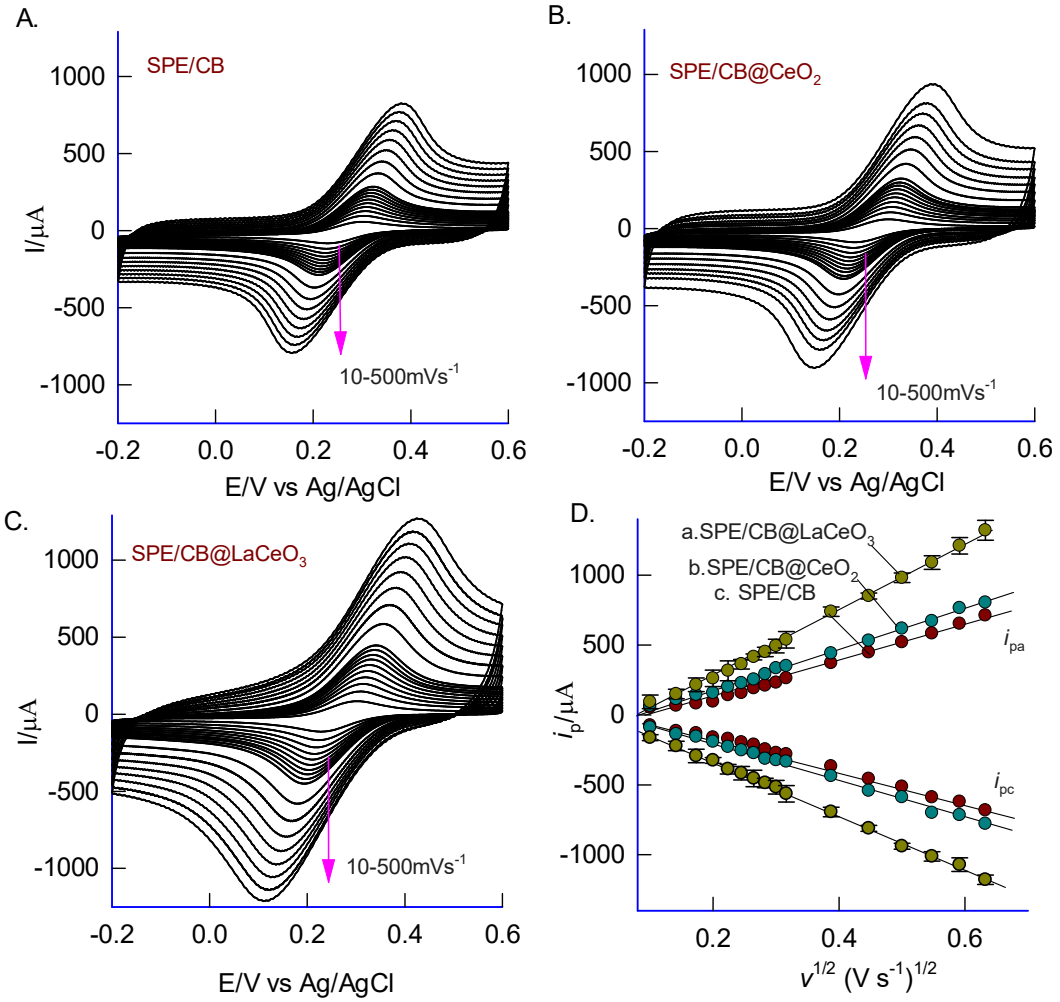

Figure S5. Scan rate study responses in the range 10-500mV s^{-1} of A) SPE/CB B) CB@CeO_2 and C) CB@$LaCeO_3$ in 5 mM $K_4[Fe(CN)_6]$ +0.1M KCl at 10mV s^{-1} in the window -0.2 to 0.6V vs Ag/AgCl. D) i_p vs $v^{1/2}$ plot

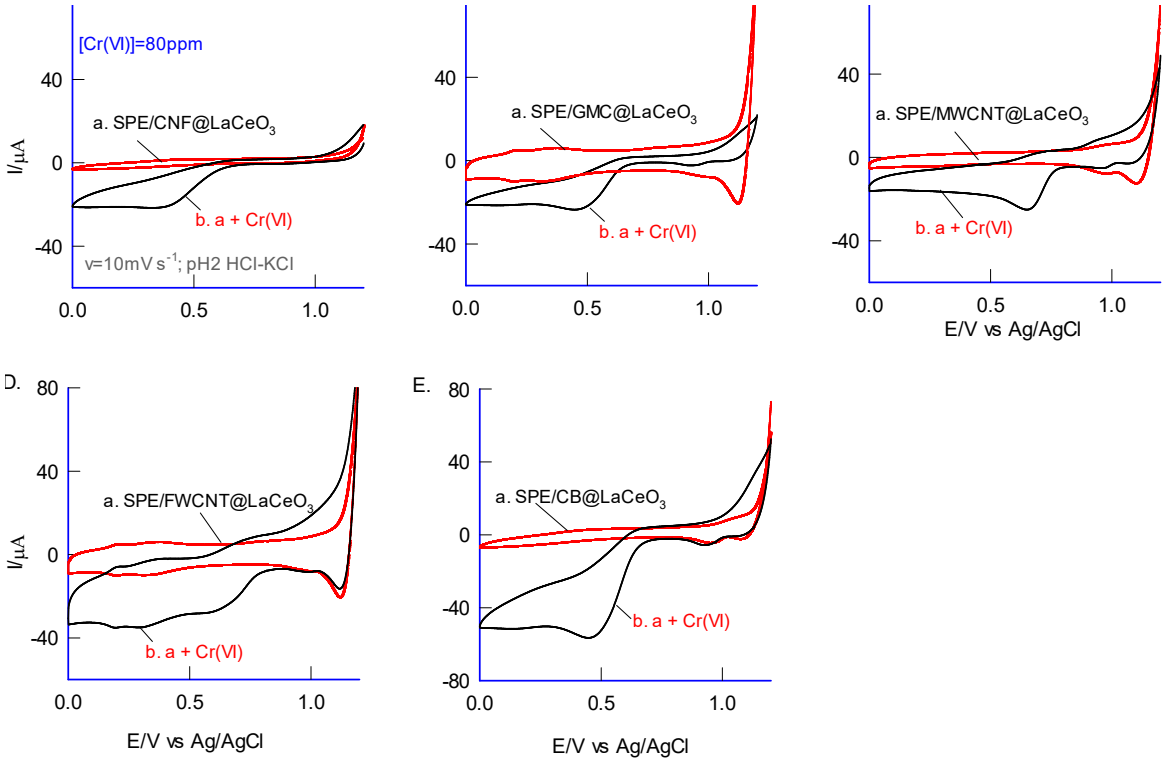

Figure S6. A) CV responses for catalytic reduction of Cr(VI) using different modified SPEs: A) SPE/CNF@$LaCeO_3$; B) SPE/GMC@$LaCeO_3$; C) SPE/MWCNT@$LaCeO_3$; D) SPE/FWCNT@$LaCeO_3$; E) SPE/CB@$LaCeO_3$ (Where, CB- Carbon black, CNF- Carbon nanofibers, GMC- Graphitized mesoporous carbon, MWCNT- Multi-walled carbon nanotubes, FWCNT- Functionalized multi-walled carbon nanotubes)

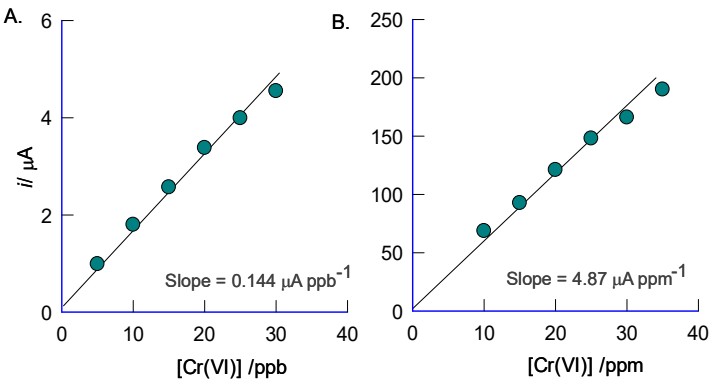

Figure S7. A) and B) Calibration plots corresponding to the BIA of the Figure 5A (low concentration range) and 5B (high concentration range) respectively. Other experimental conditions as in the Figure 5.

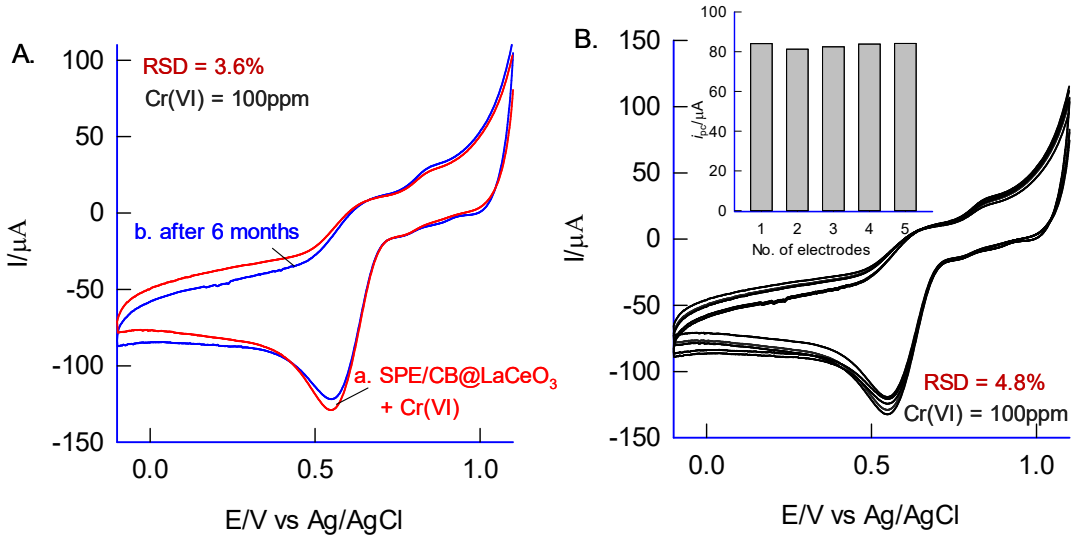

Figure S8. A) Reproducibility test of SPE/CB@$LaCeO_3$ before and after 6 months duration; B) Reproducibility test on 5 different SPE/CB@$LaCeO_3$ electrodes prepared on the same day.

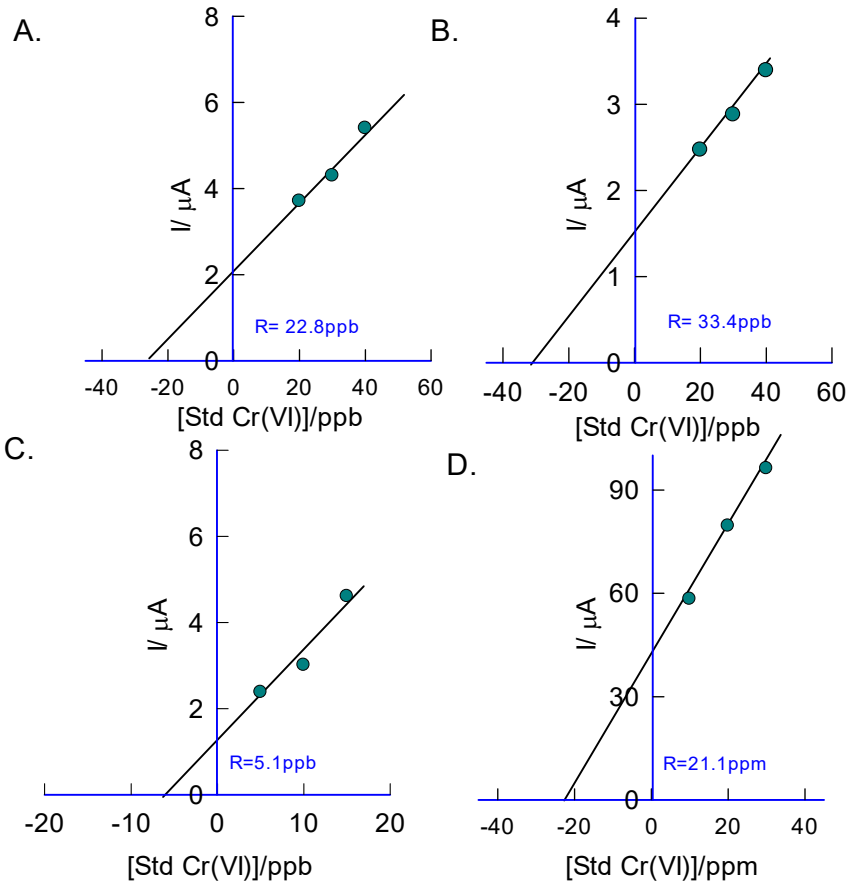

Figure S9. Standard addition calibration plot corresponding to real sample analysis responses in Figure 6A-D in main text.

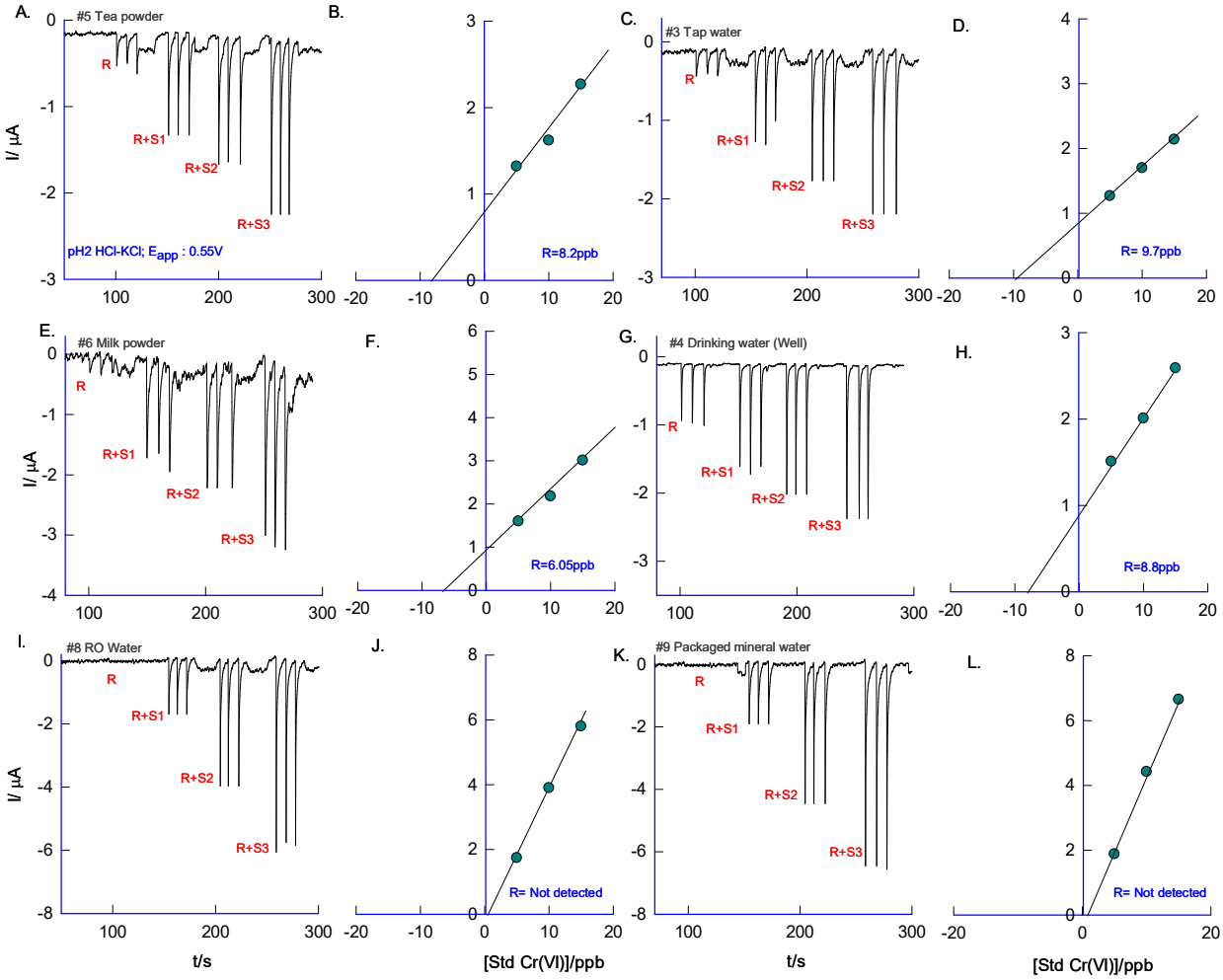

Figure S10. BIA based real sample analysis data of various samples its standard addition plots. A-B) Tea powder; C-D) Tap water; E-F) Milk water; G-H) Drinking water; I-J) RO water; K-L) Packaged mineral water.

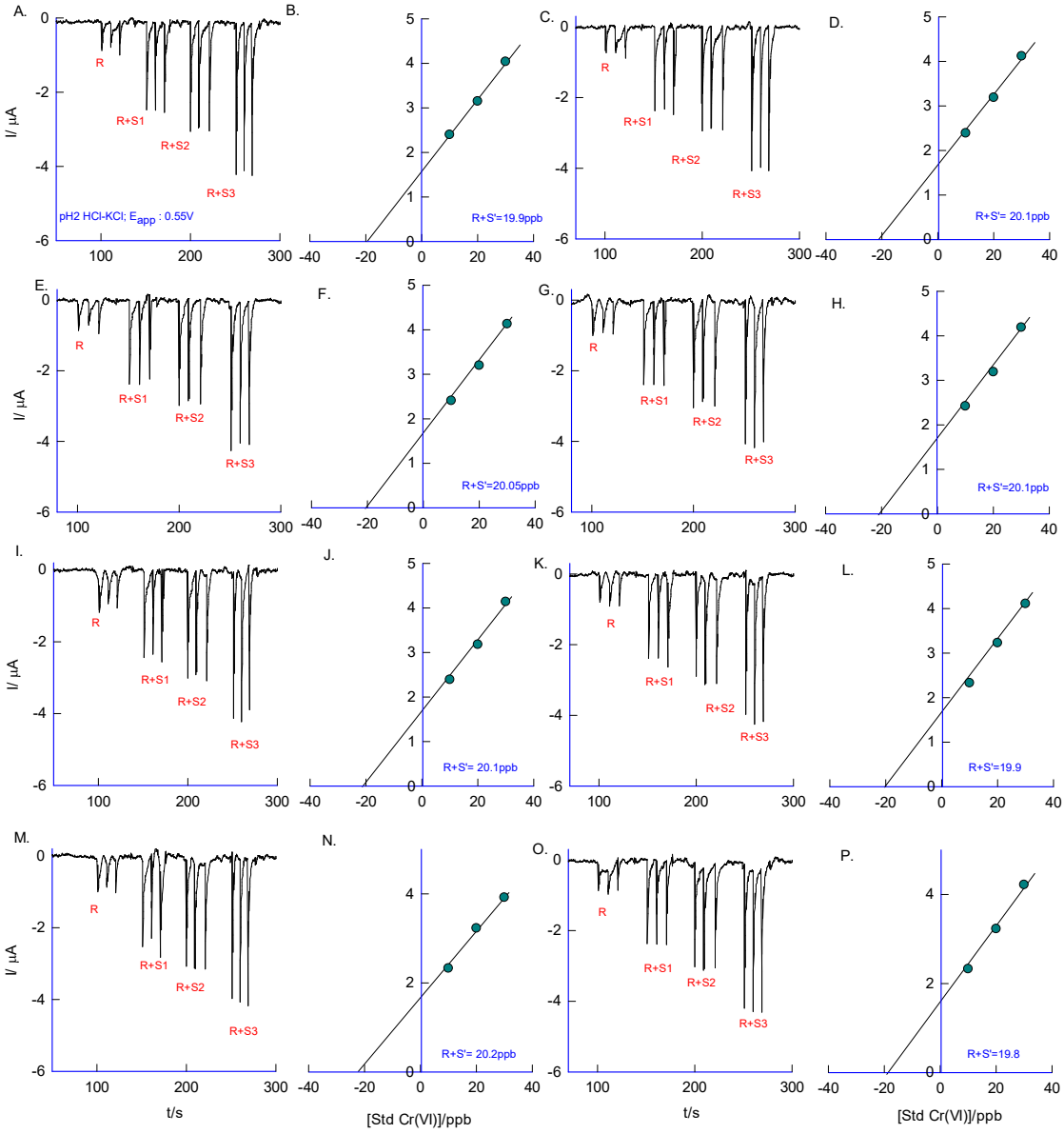

Figure S11. BIA method validation of Cr(VI) measurement using the developed sensor system with RO water as the sample of interest. Repeated analysis of RO water samples spiked with 20ppb Cr(VI) and followed by incremental standard additions (10, 20, 30ppb) repeated eight times for t-test validation.