Electronic Supplementary Material (ESI) for RSC Advances.


# An electrochemical sensing platform for trace recognition and detection of an anti-prostate cancer drug flutamide in biological samples

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**Statistical study of different modified electrodes and buffers**

In this paper an electrochemical sensor has been fabricated based on ferrocene, multiwalled carbon nanotubes and graphite powder. To test the sensitivity and selectivity of sensor, other two electrodes namely, MWCNTs/CPE and CPE have been compared. The reproducibility of all three electrodes has been investigated for three different CPEs, MWCNTs/CPEs and FC/MWCNTs/CPEs in 15 µM flutamide solution. The relative standard deviation was calculated to be 2.36%, 0.95 and 1.04 respectively. These results revealed that there is no significant difference in performance of all electrodes. The experiments were also carried out in different buffers at 4.5 pH employing three different CPEs, MWCNTs/CPEs and FC/MWCNTs/CPEs in 15 µM flutamide solution.

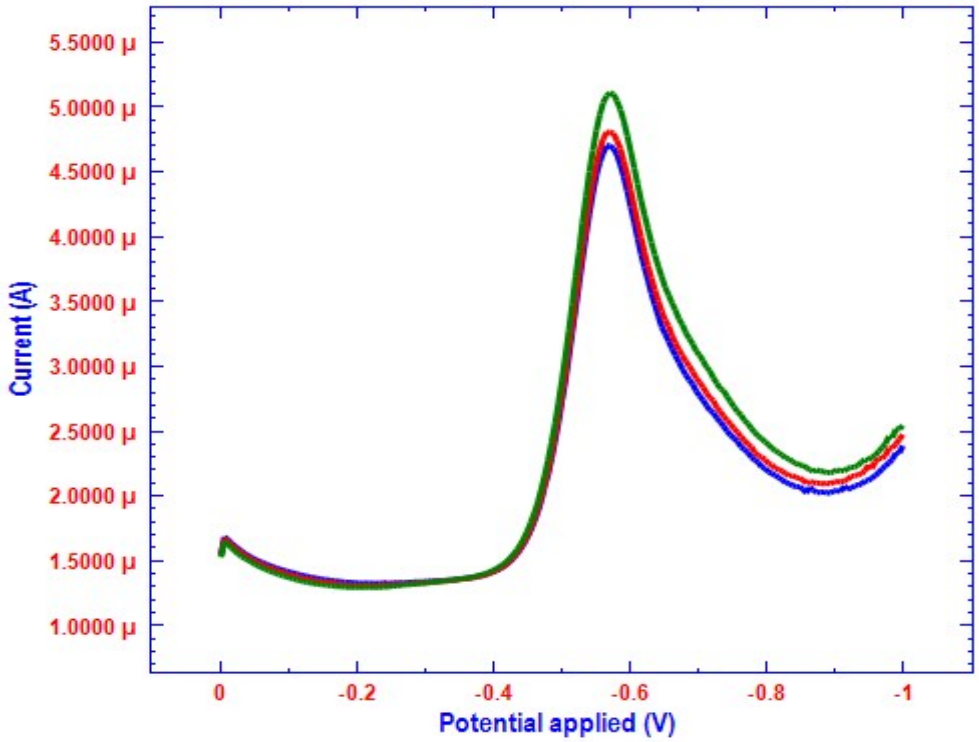


**Fig. S1 Square wave voltammograms of 15µM FT at three different CPEs**

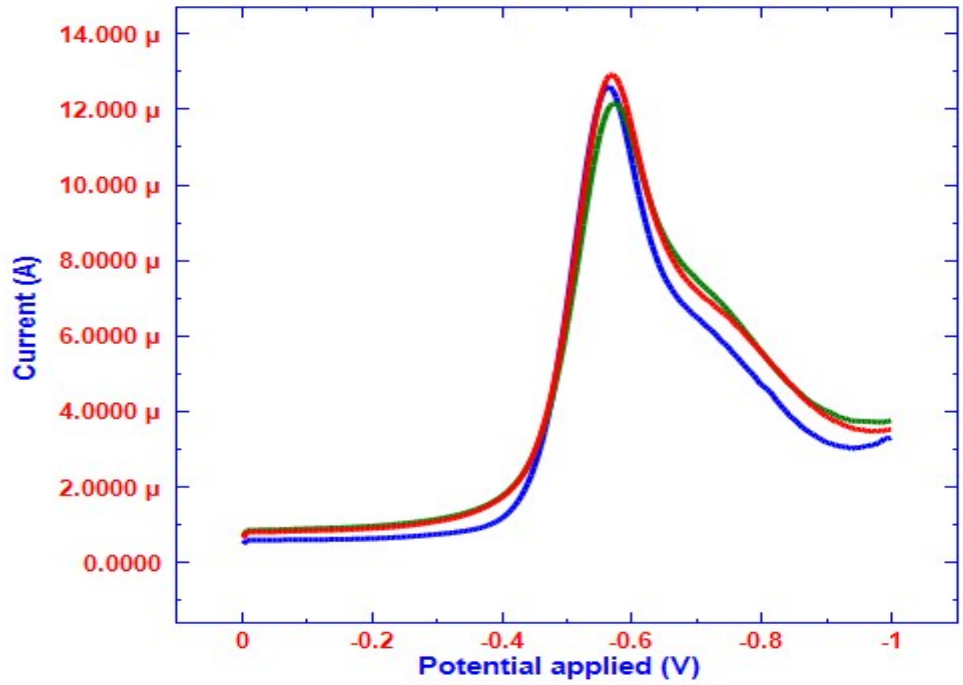


**Fig. S2 Square wave voltammograms of 15µM FT at three different MWCNTs/CPEs**

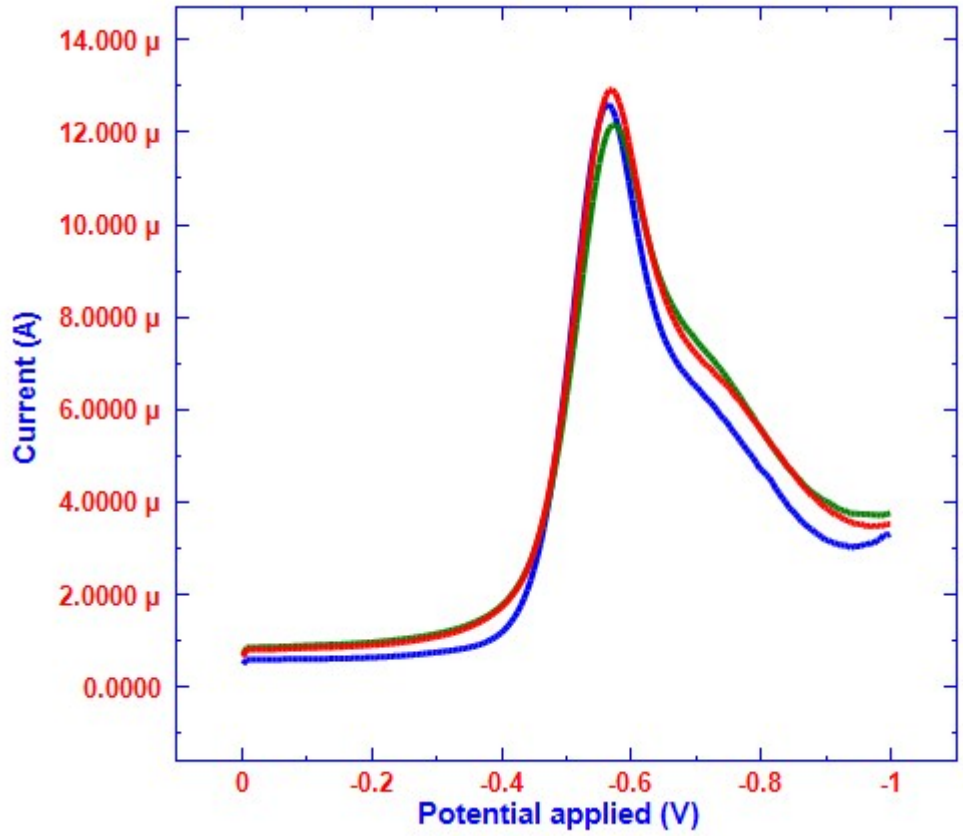


**Fig. S3 Square wave voltammograms of 15µM FT at three different FC/MWCNTs/CPEs**

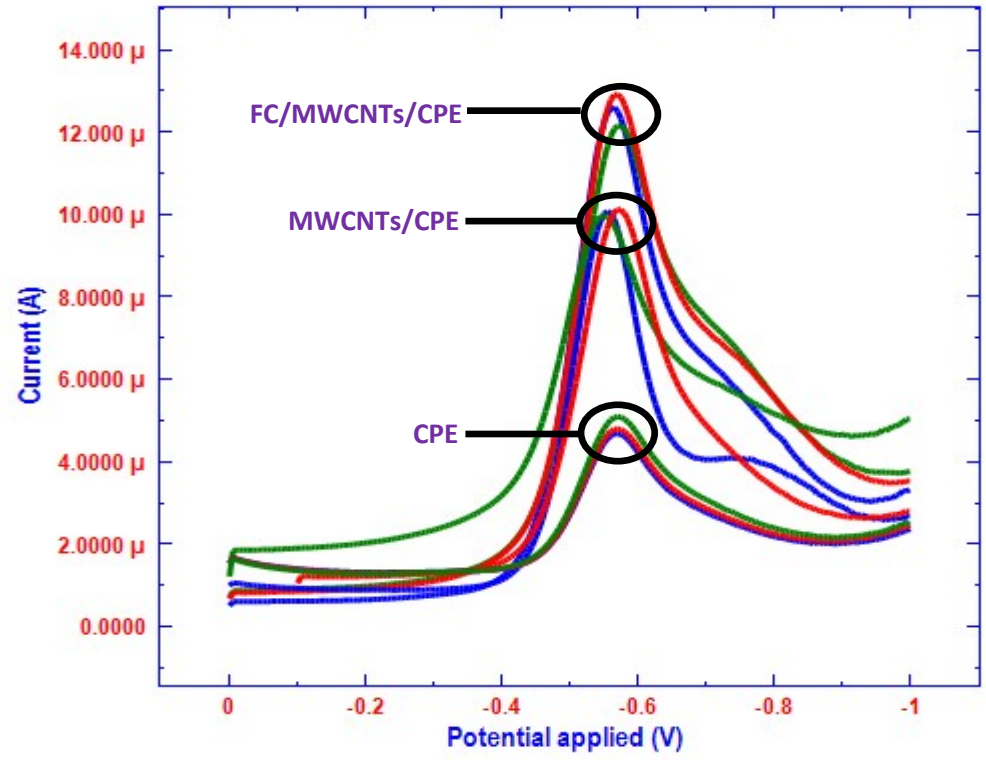


**Fig. S4 Comparative square wave voltammograms of 15µM FT at three different CPE, MWCNTs/CPE and FC/MWCNTs/CPE**

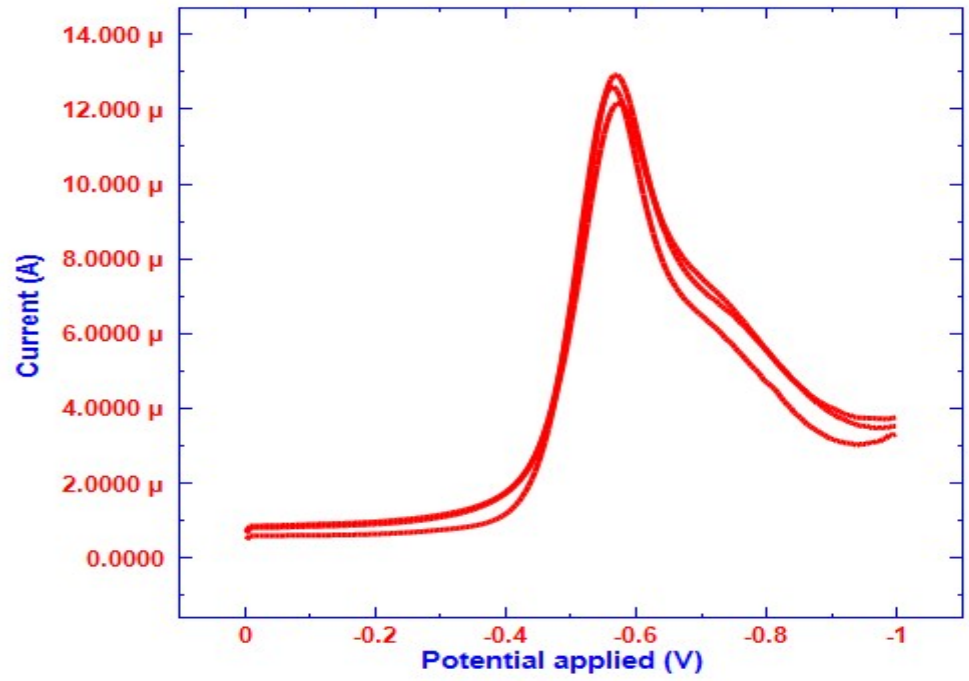


**Fig.S5 Square wave voltammograms of 15µM FT in 4.5 pH acetate buffer at three different FC/MWCNTs/CPEs**

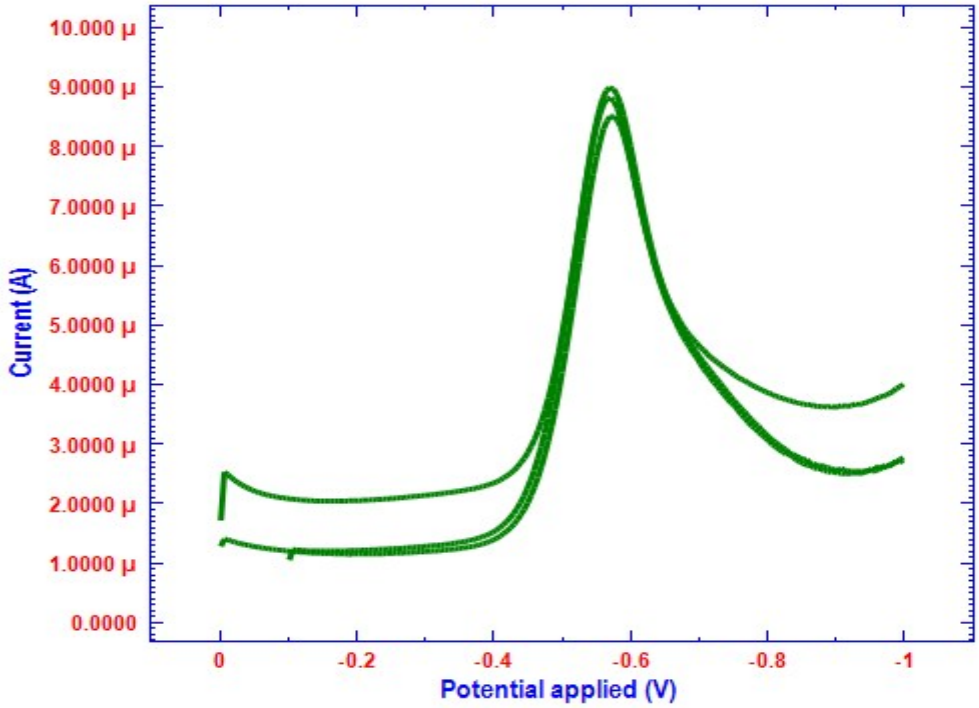


**Fig.S6 Square wave voltammograms of 15µM FT in 4.5 pH phosphate buffer at three different FC/MWCNTs/CPEs**

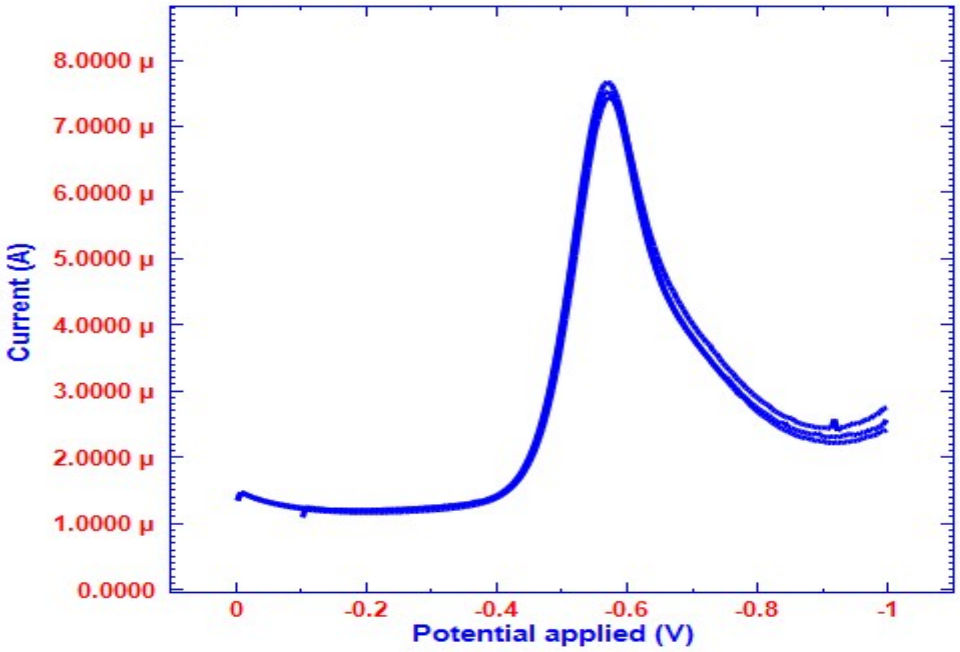


**Fig.S7 Square wave voltammograms of 15µM FT in 4.5 pH BR buffer at three different FC/MWCNTs/CPEs**

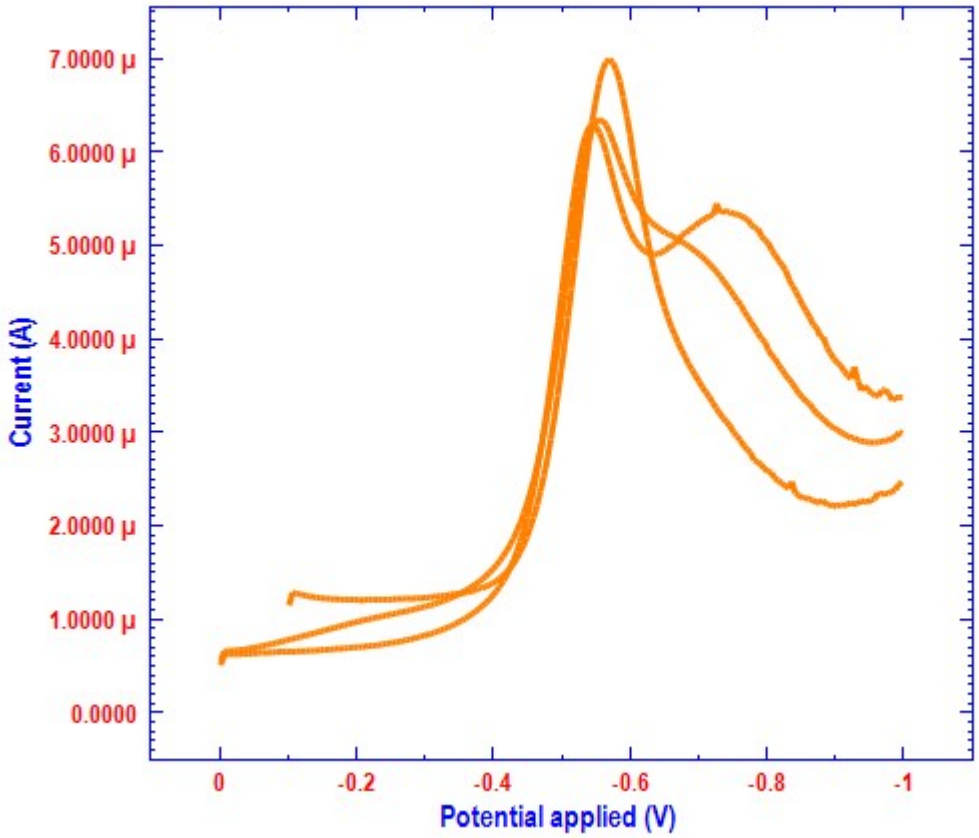


**Fig.S8 Square wave voltammograms of 15µM FT in 4.5 pH Tris buffer at three different FC/MWCNTs/CPE**

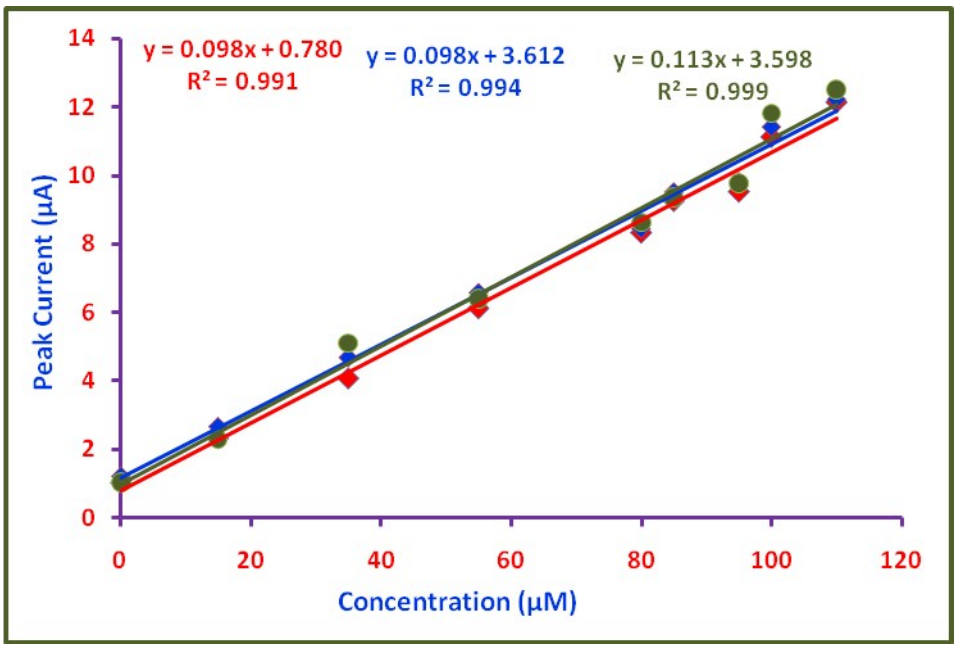


**Fig.S9 Calibration curve of FT at 3 different FC/MWCNTs/CPEs**

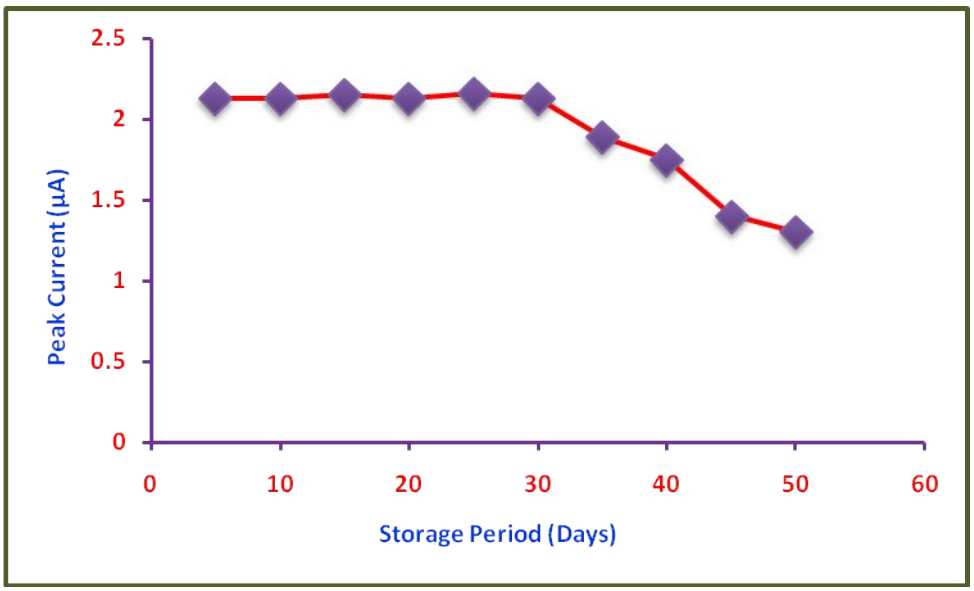


**Fig.S10 Storage ability of FC/MWCNTs/CPE over 50 days for 15µM Flutamide**

**Table S1 Statistical parameters for different modified electrodes**

| Drug Concentration | Electrodes | Peak Current (µA) | RSD % | t-test | p-value |
|---|---|---|---|---|---|
| 15µM | CPE-1 | 4.7089 | 2.36 | - | - |
| | CPE-2 | 4.8157 | | | |
| | CPE-3 | 4.5934 | | | |
| 15µM | MWCNTs/CPE-1 | 10.301 | 1.68 | -17.72 | 0.00006 |
| | MWCNTs/CPE-2 | 9.9609 | | | |
| | MWCNTs/CPE-3 | 10.143 | | | |
| 15µM | FC/MWCNTs/CPE-1 | 12.186 | 1.04 | | |
| | FC/MWCNTs/CPE-2 | 12.324 | | | |
| | FC/MWCNTs/CPE-3 | 12.443 | | | |

**Table S2 Statistical parameters for FC/MWCNTs/CPE**

| Buffers | Electrodes | Peak Current (µA) | RSD % | t-test | p-value |
|---|---|---|---|---|---|
| Acetate Buffer | FC/MWCNTs/CPE-1 | 12.343 | 1.39 | 20.54936 | 0.000033 |
| | FC/MWCNTs/CPE-2 | 12.524 | | | |
| | FC/MWCNTs/CPE-3 | 12.18 | | | |
| Phosphate | FC/MWCNTs/CPE-1 | 9.0088 | 2.80 | | |

| | | | | | |
|---|---|---|---|---|---|
| **Buffer** | **FC/MWCNTs/CPE-2** | **8.8348** | | | |
| | **FC/MWCNTs/CPE-3** | **8.5236** | | | |
| **BR Buffer** | **FC/MWCNTs/CPE-1** | **7.5348** | **1.60** | **-** | **-** |
| | **FC/MWCNTs/CPE-2** | **7.6874** | | **-** | **-** |
| | **FC/MWCNTs/CPE-3** | **7.4493** | | **-** | **-** |
| **Tris-HCl Buffer** | **FC/MWCNTs/CPE-1** | **6.3599** | **4.26** | **-** | **-** |
| | **FC/MWCNTs/CPE-2** | **6.7474** | | **-** | **-** |
| | **FC/MWCNTs/CPE-3** | **6.2164** | | **-** | **-** |

**Table-S3 Analysis of FT in biological samples using standard addition method**

| Technique | Medium | Dilution Factor | [a]Added µM | [a]Found µM | % recovery | RSD % |
|---|---|---|---|---|---|---|
| AdSWV | Serum | 1:200 | 5 | 4.95 | 99 | 2.21 |
| | | | 10 | 9.80 | 98 | 1.86 |
| | Plasma | 1:200 | 5 | 4.81 | 96.2 | 3.54 |
| | | | 10 | 9.70 | 97 | 3.28 |
| | Urine | 1:200 | 5 | 4.95 | 99.0 | 2.34 |
| | | | 10 | 9.90 | 99.0 | 3.14 |

**[a] Average of five replicate measurements.**