Supplementary Information (SI) for Environmental Science: Nano.

Electrochemical investigation of antipyretic drug in plant extracts and environmental samples at O-MWCNT/ CuO nanostructures modified glassy carbon electrode

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Number of pages: 09

Number of figures: 08

Number of table: 03

S1. Electrochemical measurements and Characterization techniques

The Ag/AgCl reference, platinum wire counter, and GC working electrodes comprised a typical three electrode system that was used to execute the Cyclic Voltammetry (CV), Linear Sweep Voltammetry (LSV), and Amperometry (Amp) procedures utilizing the CHI 6005d and 440b electrochemical setup (CH Instruments, USA). The 400–700 nm wavelength region of the high-performance single monochromator Shimadzu UV2450 was used to record UV-visible spectra. The Perkin Elmer Nicolet IS10 was used to record FTIR spectra in the 4000-400 cm^{-1} frequency band. For XRD measurements, a Bruker D-8 advanced powder diffractometer (PANalytical, B.V., The Netherlands) with Cu-K1 radiation (2.2 KW maximum) was utilized. SEM pictures were taken with a Zeiss SEM (model S=3000H) made by Hitachi in Japan. The JOEL-2100 high-resolution transmission electron microscope was used to take the TEM picture. An X-ray photoelectron spectrometer (Model: PHI5000 Version Probe II) manufactured by ULVAC-PHI manufacturing was used to conduct the XPS analysis.

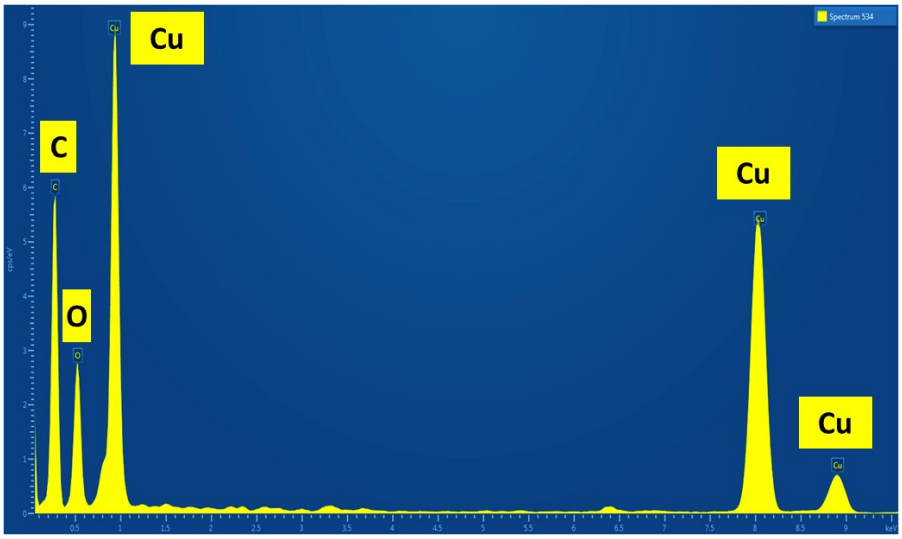

Figure S1. EDX analysis of O-MWCNT/CuO

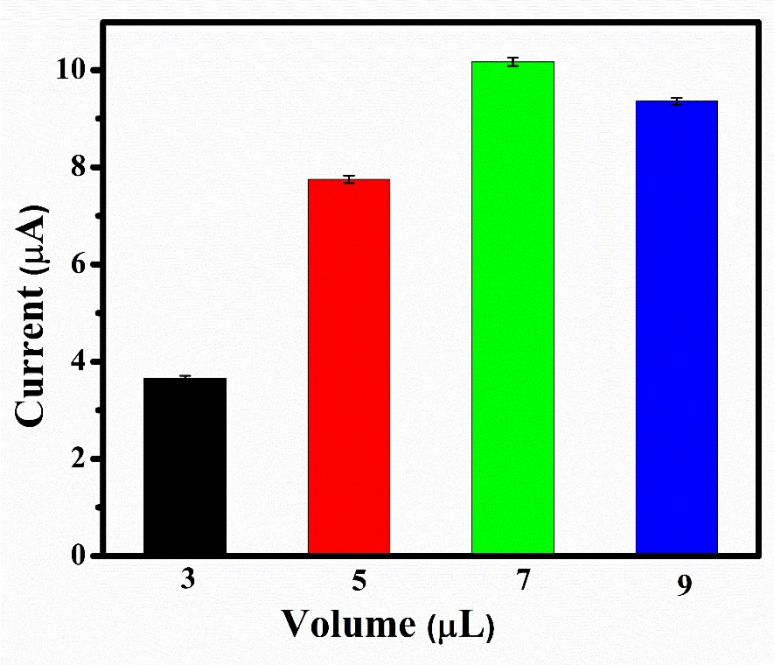

Figure S2: Bar graph on effect of mass loading measured at an applied scan rate of 50 mV/S in *pH* 7.0 (PBS).

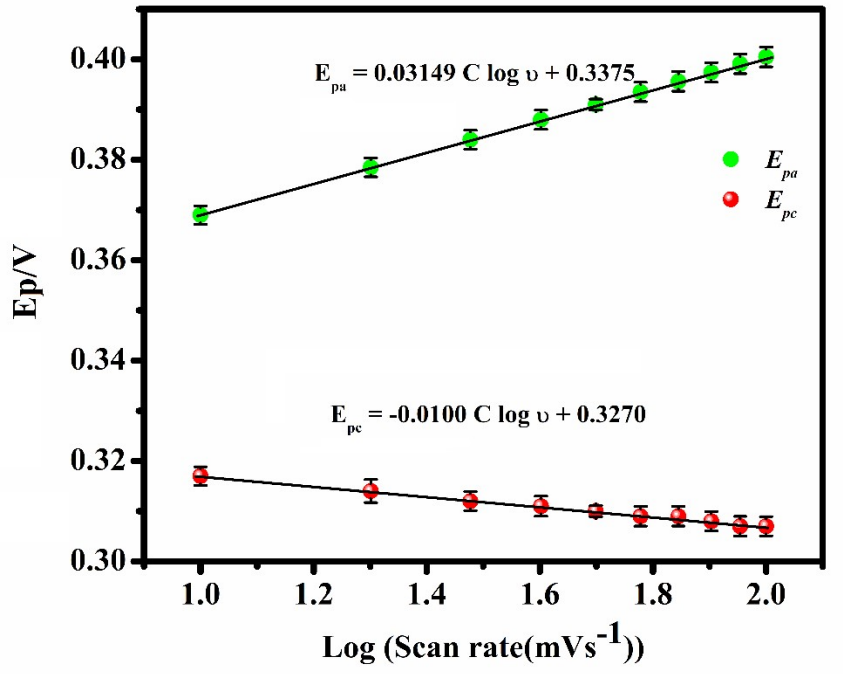

Figure S3: Linear plot of redox peak potential versus logarithmic of scan rate

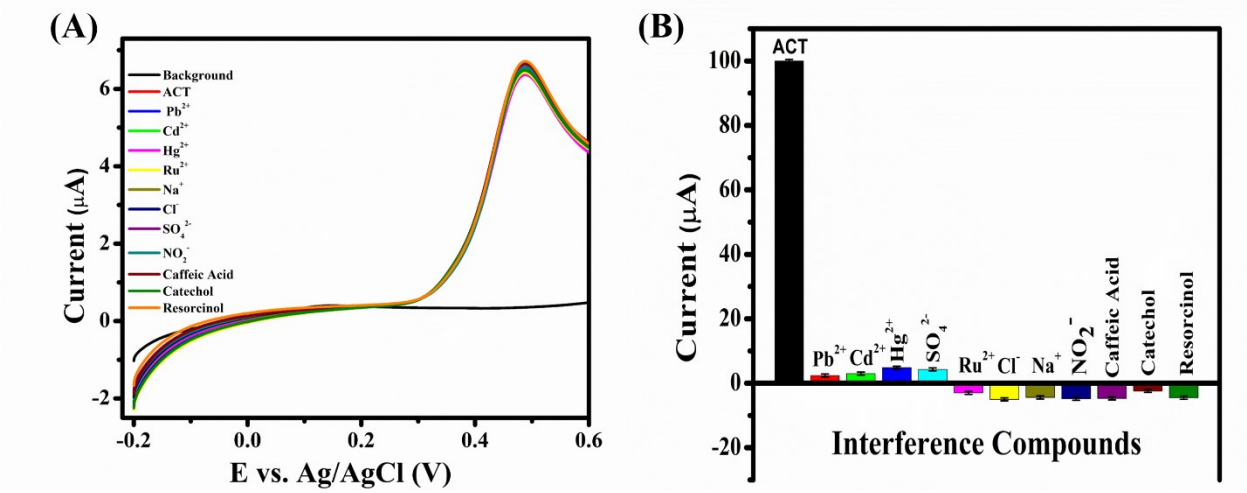

Figure S4: (A) Effect of potential interferences (250.0 µM) on the oxidation of ACT (50.0 µM) at the O-MWCNT/CuO modified electrode using LSV in PBS (*pH* 7.0) and (b) Bar chart of obtained current with error values.

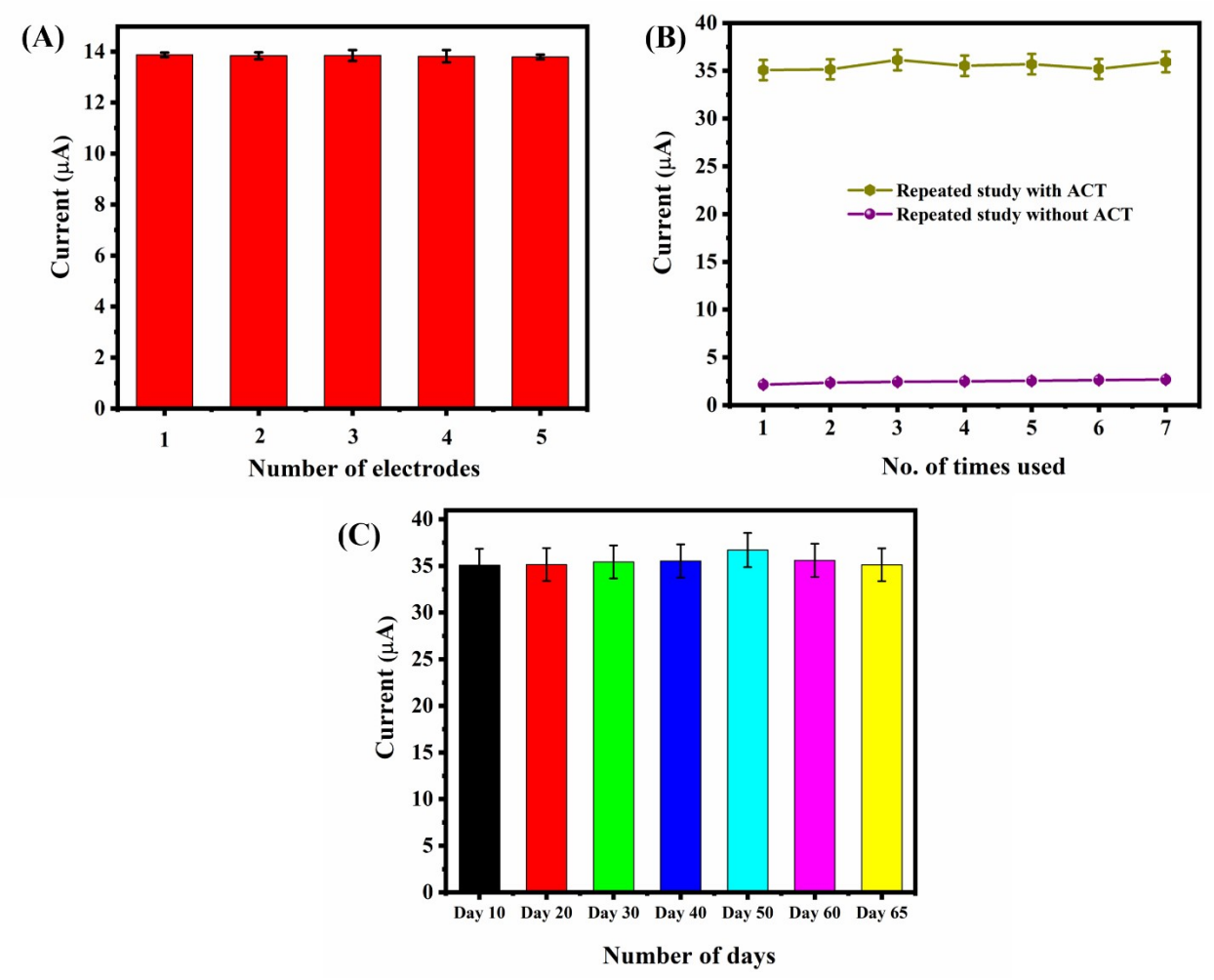

Figure S5: (A) Reproducibility, (B) Repeatability and (C) storage stability of the modified O-MWCNT/CuO sensor towards the ACT detection.

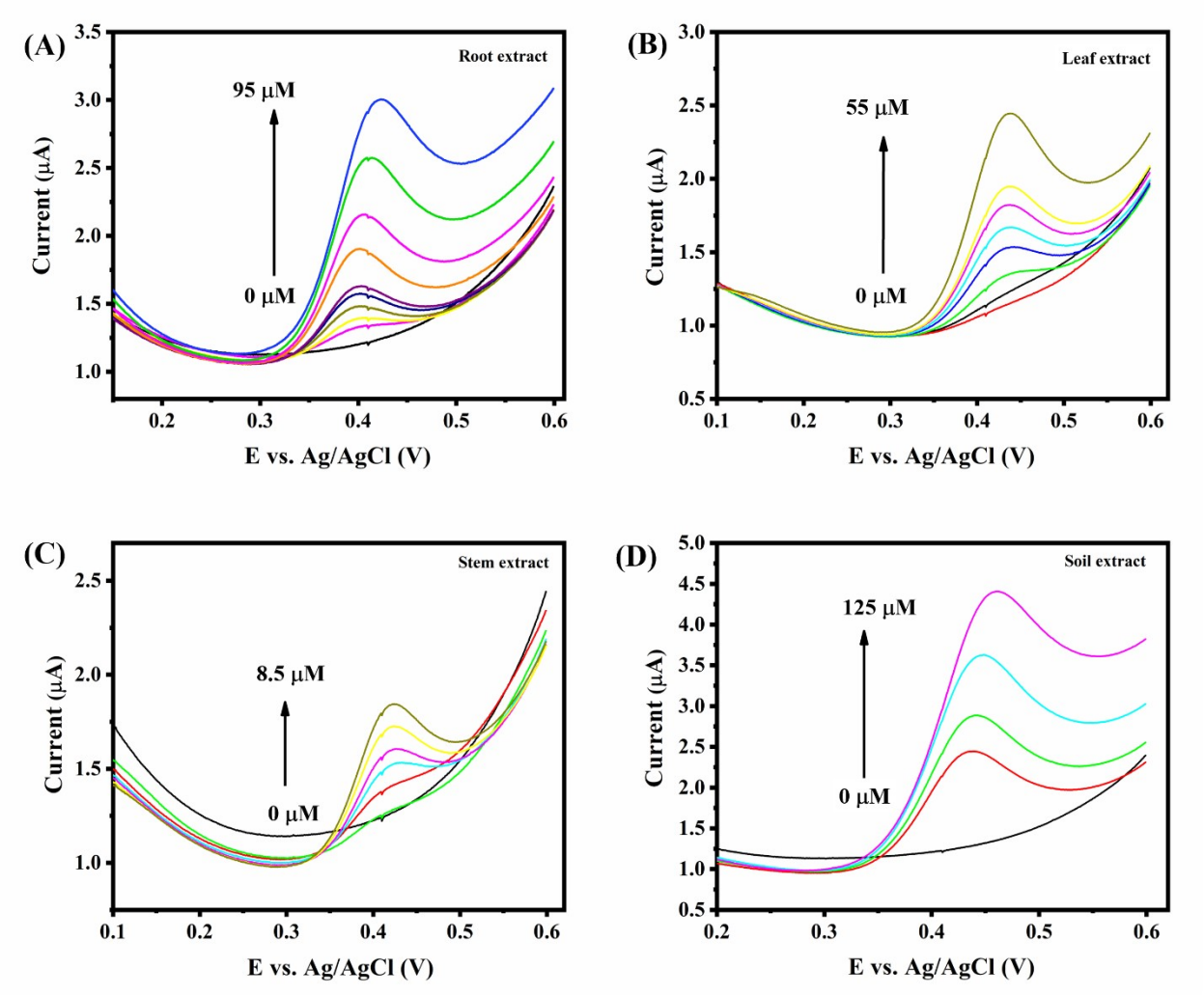

Figure S6. LSV signals of biological fluids (A) root extract, (B) leaf extract, (C) steam extract and (B) soil extract by spiking known concentrations of ACT at an applied scan rate of 50 mV/S in *pH* 7.0 (PBS).

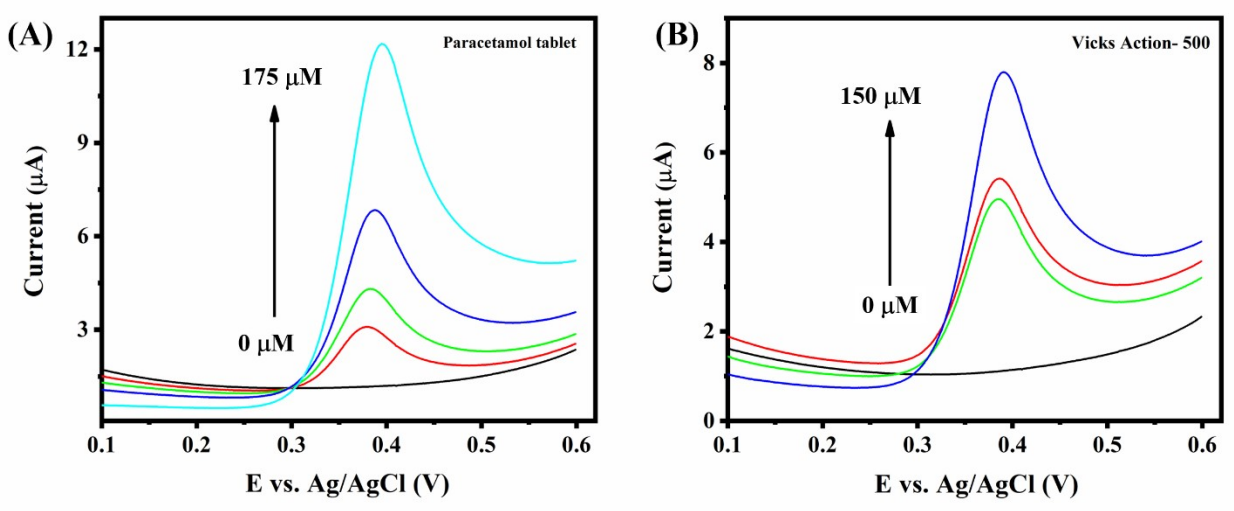

Figure S7. LSV curves of real sample drugs (A) Paracetamol tablet and (B) Vicks action 500 at an applied scan rate of 50 mV/S in *pH* 7.0 (PBS).

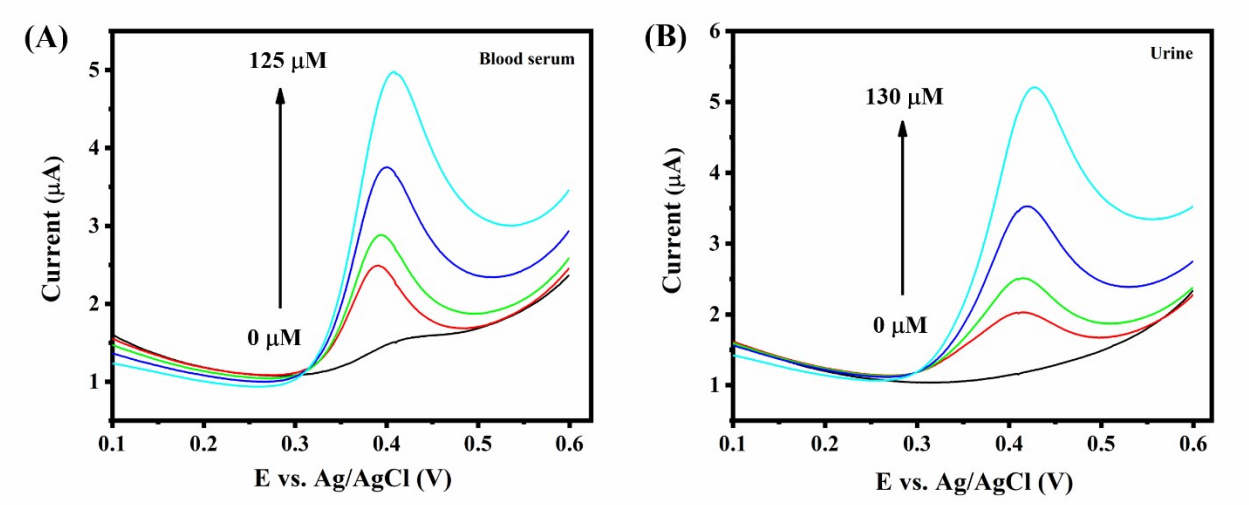

Figure S8. LSV measurements of biological fluids (A) Blood serum and (B) Urine by spiking known concentrations of ACT at an applied scan rate of 50 mV/S in pH 7.0 (PBS).

Table S1. The practical applicability of ACT determination in environmental waste water samples

Sample	Added (µM)	Found (µM)	Recovery (%)	RSD (%)
River water	06	5.98	99.66	2.79
	40	40.02	100.05	2.01
	80	77.9	97.37	2.81
	120	118.8	99.00	2.48
Well water	06	5.93	98.83	2.15
	30	29.72	99.06	1.74
	75	74.58	99.44	1.84
	120	117.40	97.83	2.17
Pond water	08	7.93	99.12	1.71
	45	44.51	98.91	2.04
	90	88.58	98.42	3.17
	125	125.06	100.04	2.89

Table S2. The practical applicability of ACT detection in phamacitical products

Sample	Added (µM)	Found (µM)	Recovery (%)	RSD (%)
PCM tablet	100	100	100.0	2.45
	125	123.04	98.43	1.79
	140	139.14	99.38	2.61
	175	174.26	99.57	3.03
Vicks Action 500	130	129	99.2	1.71
	140	133.45	95.32	2.54
	150	147.79	98.52	2.08

Table S3. The practical applicability of ACT detection in biological fluids

Sample	Added (µM)	Found (µM)	Recovery (%)	RSD (%)
Blood serum	60	59.48	99.13	2.07
	80	79.25	99.06	2.39
	110	110.07	100.06	1.62
	125	123.54	98.83	2.38
Urine	25	25.05	100.20	1.53
	60	59.15	98.58	3.29
	125	123.35	99.48	1.90
	130	128.56	98.89	2.56