Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Rational construction of micro-plate like iron oxide/aluminium oxide fabricated screen printed carbon electrode for the electrochemical detection of antiandrogen drug

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S1. Materials and characterization techniques

The chemicals for synthesis of FeAlO were iron nitrate ≥98.0%, aluminium chloride 99.0%, urea 100.5%, and ammonium hydroxide ≥99.99%. While the chemicals used for the electrochemical sensing were nilutamide (NTM) ≥99.99%, 4-nitrophenol ≥99.0%, aminophenol ≥98.0%, nitrobenzene ≥99.0%, acetaminophen ≥98.0%, flutamide ≥99.99%, chlorine ions ≥99.99%, sodium ions ≥99.99%, glucose ≥99.5%, mercury ≥99.99%, mesalamine ≥99.0%, ciprofloxacin ≥98.0%, carbendazim ≥97.0%, nifedipine ≥98.0%, and hydroquinone ≥98.0%. These chemicals and reagents as bought from Sigma Aldrich; Taiwan were directly taken for the reaction to be conducted without undergoing any purification steps. Ethanol and deionized (DI) water were used to clean and for conducting other experiments.

Characterization techniques as XRD, XPS, Raman, FESEM, and EDAX were carried out to explore the analysis of FeAlO. The XRD study was done with an X-ray diffractometer (PANalytical XPert PRO), with Cu-Kα radiation (λ=0.1541 nm). The XPS analysis employed with X-ray photoelectron spectroscopy (XPS-ESCALAB 250, THERMO SCIENTIFIC Ltd, Netherlands). The presence of functional groups in the samples was identified with Perkin-Elmer Fourier transforms infrared spectrometer (CHI 1000 C, FT-IR-6600). The Field emission scanning electron microscope (FESEM) with ZEISS Sigma 300 SEM microscope coupled with energy-dispersive X-ray spectroscopy (EDX) for morphology analysis. The electrochemical studies were done with cyclic voltammetry (CV), and differential pulse voltammetry (DPV) techniques with CHI1205C, and CHI900. The electrochemical setup with the three-electrode system was utilized with the working electrode as a screen-printed carbon electrode (electrochemical sensing) (surface area – 0.035 cm^2). The reference electrode employed was Ag/AgCl (3.5 M KCl) electrode and the counter electrode was a platinum

wire. The NTM concentration study were analyzed by DPV, for this study the potential ranges 0.3 to -0.9 V and 0.1 M PB solution were performed.

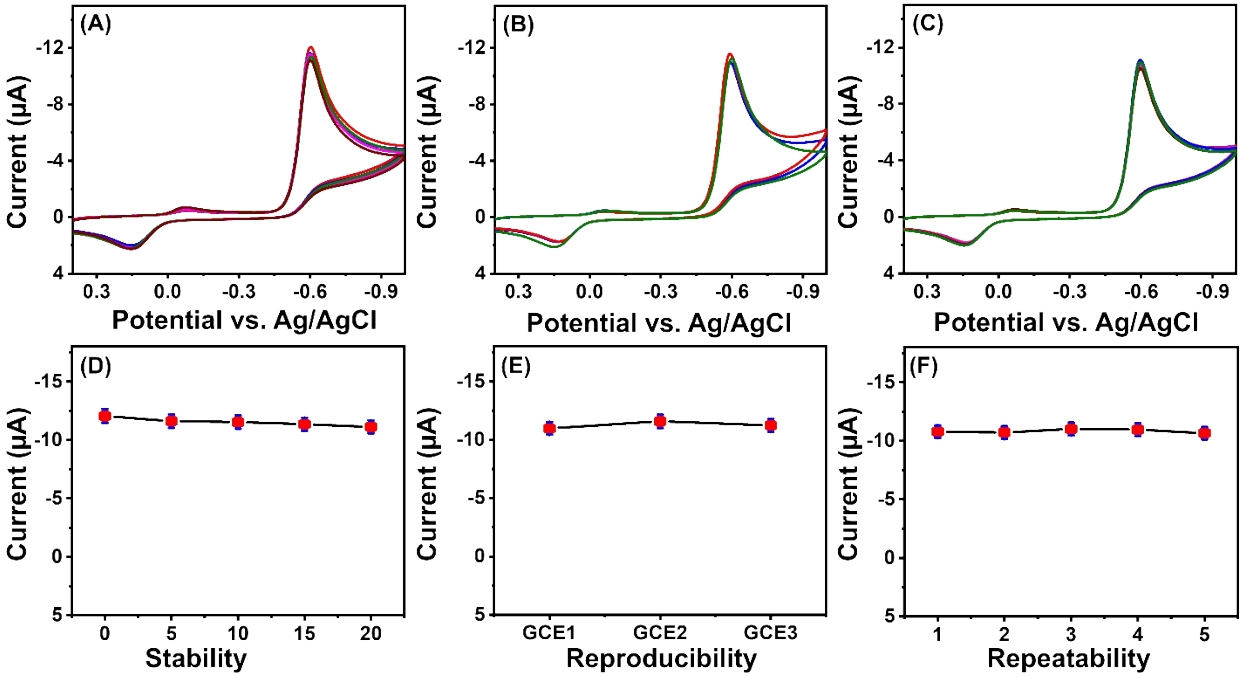

Fig. S1. Cyclic voltammetry curves of FeAlO/SPCE with 75 µM of NTM **(A)** stability, **(B)** reproducibility, **(C)** repeatability, and **(D-F)** histogram plot of stability, reproducibility, and repeatability.

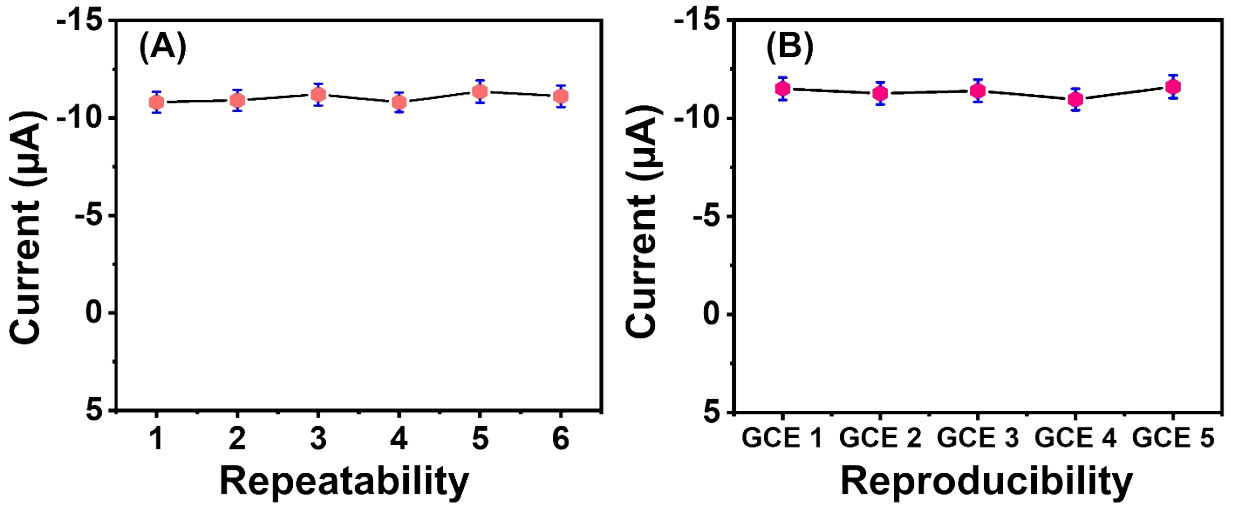

Fig. S2. Histogram plot of repeatability (6 repeated analysis) and reproducibility (5 independent electrodes) analysis studied at FeAlO/SPCE with 75 μM of NTM **(A–B)**.

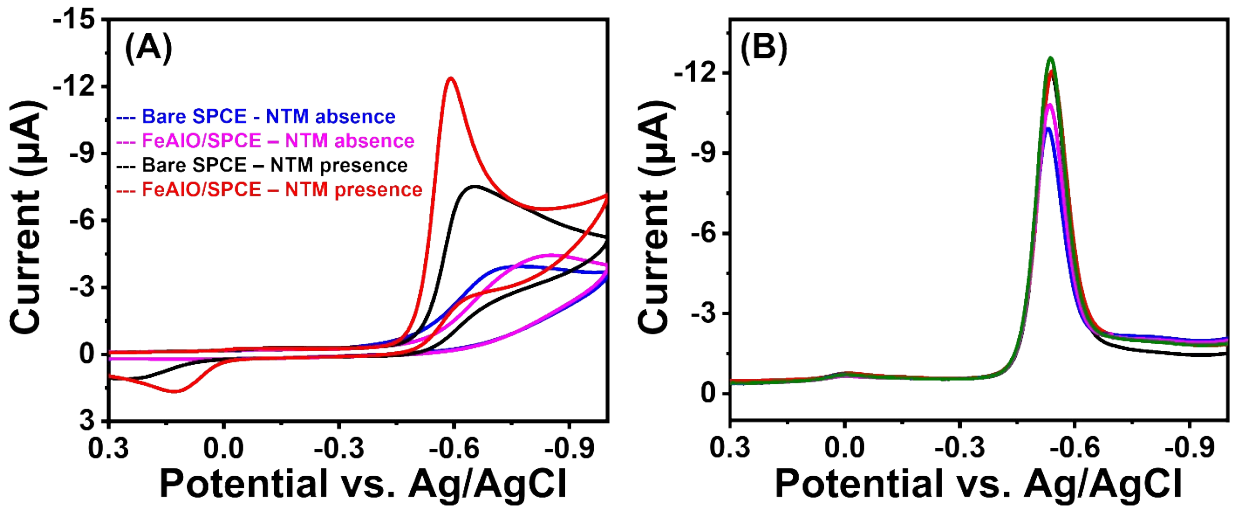

Fig. S3 CV curves studied at bare SPCE, and FeAlO/SPCE with (75.0 μM) and without the addition of NTM at scan rate 0.05 V/s **(A)** DPV curves of the selectivity analysis studied in 0.1 M of PBS with metal ions Cd^{2+}, Cr^{2+}, Pb^{2+}, and Zn^{2+}**(B)**.

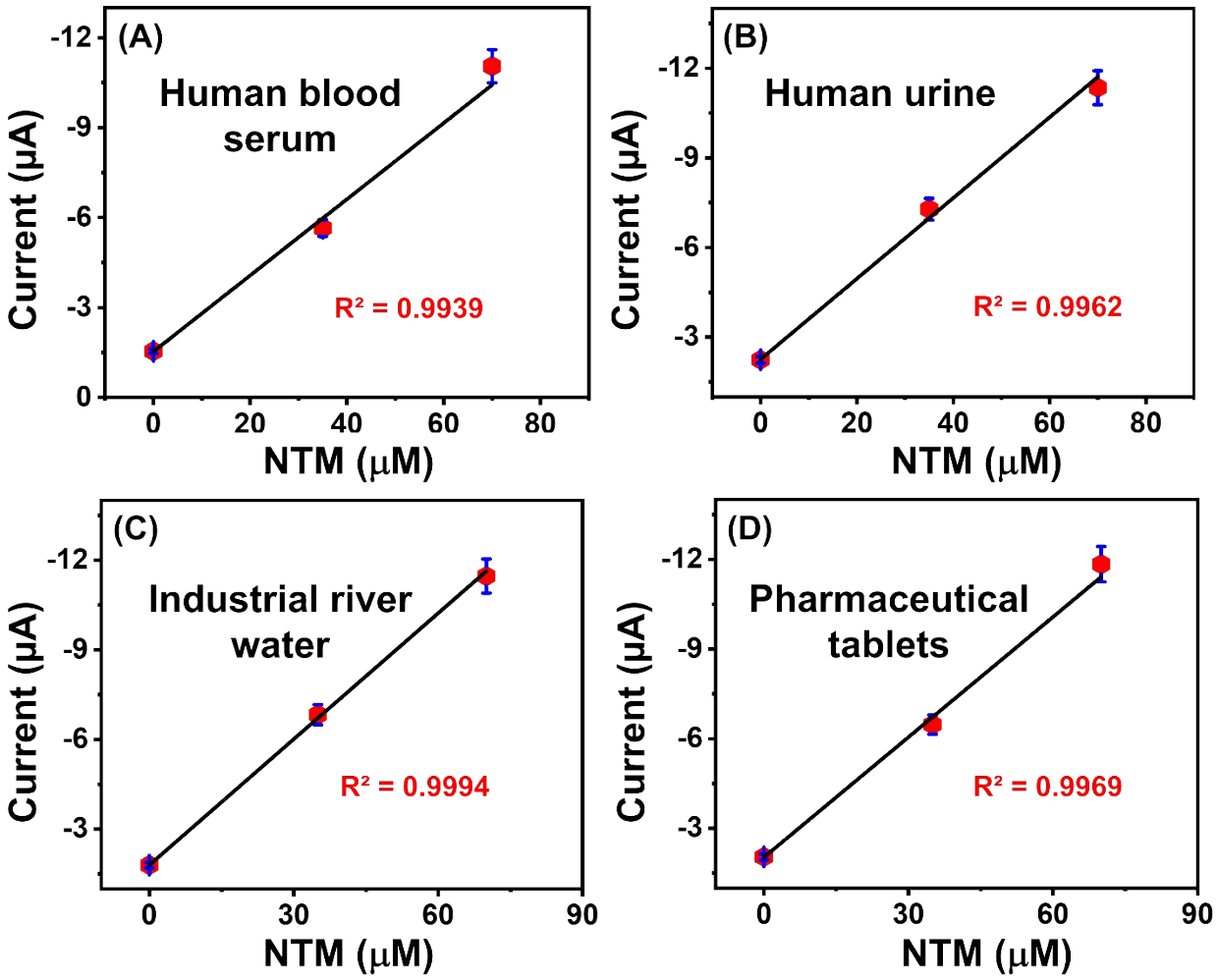

Fig. S4A–D Linear plots for real samples analysis done at FeAlO/SPCE for real samples as human blood serum, human urine, industrial river water, and pharmaceutical tablets with NTM vs current.