Supporting information

Facile synthesis of erbium vanadate nanoribbons for electrochemical detection of 4-nitrotoluene

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Chemicals and reagents

Erbium nitrate, ($Er(NO_3)_3$), Ammonium metavanadate (NH_4VO_3), Urea ($CO(NH_2)_2$, Polyvinylpyrrolidone $(C_6H_9NO)_n$, 4-Nitrotoluene ($C_7H_7NO_2$), $[Fe(CN)_6]^{4-,3-}$, sodium hydroxide (NaOH), potassium chloride (KCl), sodium phosphate dibasic (Na_2HPO_4), sodium dihydrogen phosphate (NaH_2PO_4), acetone, and ethanol were procured. Ultrapure fresh water is obtained from a millipore water purification system (Milli-Q, specific resistivity > 18 MΩcm, S.A.; Molsheim, France) and is used in all the experiments and Na_2HPO_4 and NaH_2PO_4 are utilized to prepare 0.1 M (pH 7) PB (phosphate buffer). All the electrochemical experiments are carried out using 0.1 M PB (pH 7) as the supporting electrolyte.

Instrumentation and methods

Phase configuration is identified using X-ray diffraction analysis (XRD) (Bruker (D2 XRD) instrument. The Fourier transform infrared (FTIR) spectra were recorded by using an FTIR spectrophotometer (JASCO 6600). The surface morphology and the elemental composition are studied utilizing high resolution (HR) transmission electron microscopy (TEM) (JEM−2100F (HR), JEOL LTD)) operating at 200 kV by using JOEL Serive Advanced Technology. By utilizing these characterization methods, the physical properties of the as-prepared materials are investigated. The electrochemical properties are explored using electrochemical impedance spectroscopy (EIS) through Autolab (PGSTAT101). CHI 1211c electrocatalytic workstation is functional to carry out the electrochemical measurements like cyclic voltammetry (CV) and differential pulse voltammetry (DPV) in a conventional three electrode cell. Here, the modified SPCE (surface area = 0.072 cm^2), saturated Ag|AgCl and Pt wire are active as working, reference and counter electrodes, respectively.

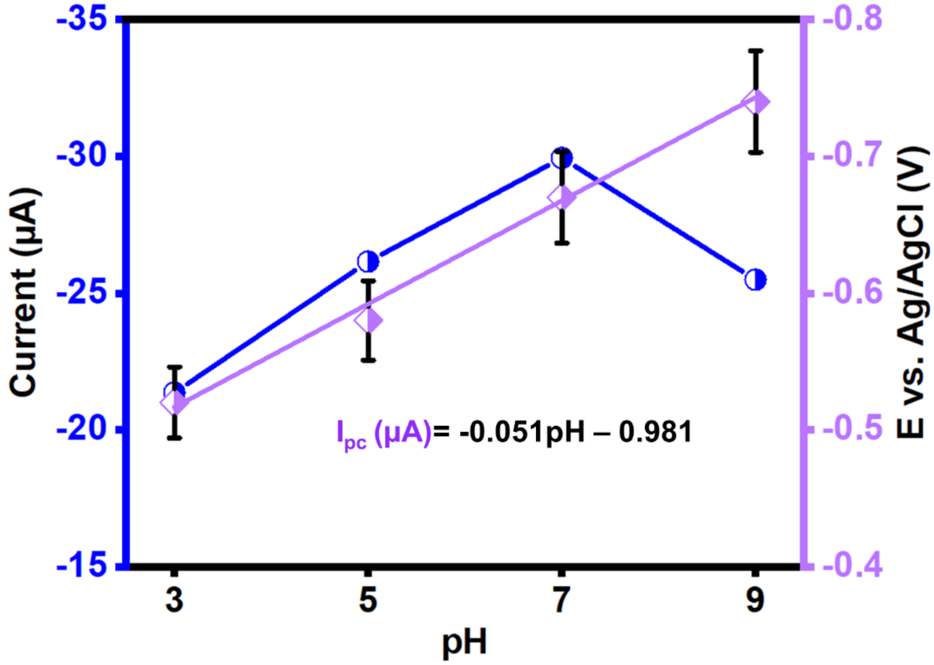

Figure S1. Plot of pH versus 4-nitrotoluene peak currents and potentials at $ErVO_4$/SPCE in the presence of 4-nitrotoluene.

Table S1. Comparison of 4-NT determination toward $ErVO_4$/SPCE with previously reported work.

Materials	**Linear range (μM)**	**Limit of detection (nM)**	**Detection technique**	**Ref.**
CeW/SPCE	0.01–576	34	DPV	S1
GCE/α-MnO_2	0.162–48.80	144.0	CV	S2
MWCNTs-GCE	225.0–2600	43.00	CV	S3
ZnC/SPCE	0.050–385.5	44.00	DPV	S4
Ag_2O NPs/Au	0.500–4.000; 37.00–175.0	62.30	LSV	S5
NH_2–Fe-MIL-88B@OMC-3	20.00–225.0	8000	DPV	S6
$ErVO_4$/SPCE	0.01-375	9	DPV	**This work**

MWCNT: Multiwall carbon nanotube, LSV: Linear sweep voltammetry, CV: Cyclic voltammetry, DPV: Differential pulse voltammetry. SPCE: Screen printed carbon electrode

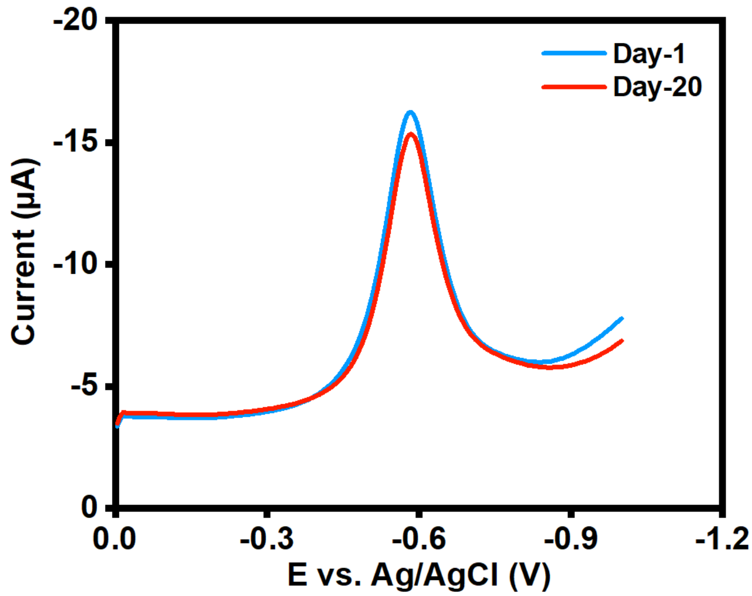

Figure S2. Long-term stability of $ErVO_4$ modified electrode in the presence of 4-NT.

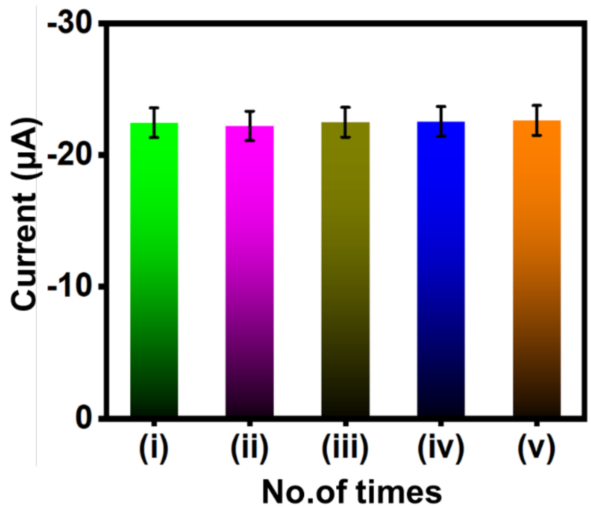

Figure S3. Repeatability of $ErVO_4$ modified electrode in the presence of 4-NT for 5times.

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