Enhanced Amperometric Detection of Tumor Biomarker Vanillylmandelic Acid Using $NiMoO_4@C_3N_5$ Hybrid Nanostructures

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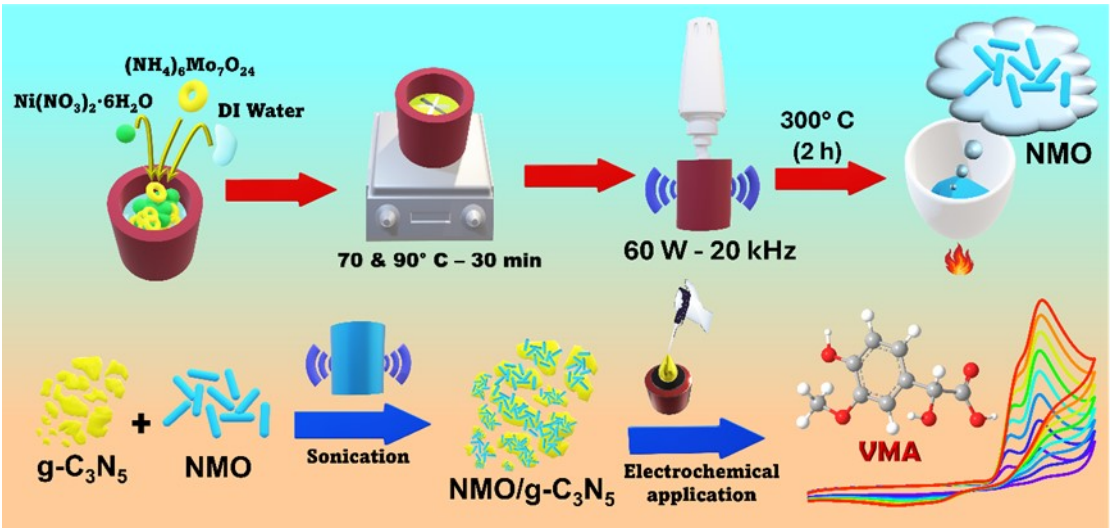
S1. Materials and instrumentations

For crystal structure confirmation was done by wielding XRD (Bruker D8 Advance Eco, China) instrument. The morphological studies of the composite were characterized by FESEM (JSM-7610F, Taiwan) and High-Resolution TEM (JEM-2100, Taiwan) instrument. The electron impedance spectroscopy (EIS) studies (t equilibration = 2s; Fixed potential (0.2 V; Number of frequencies, 56 = 9.2/dec; Frequency range from 0.1 Hz to 100000 Hz) was taken by using Palmsens4 FRA device. All voltammetry studies (CV & i-t) were grabbed by using Palmsens4 FRA electrochemical analyzer device. For electrochemical studies, common three electrode system was used where, glassy carbon electrode and rotating disk electrode as a working electrode, platinum wire as a counter electrode and Ag/AgCl (3M KCl) as a reference electrode.



Scheme S1. Diagrammatic illustration for the synthesis of NMO nanorods.

S2. Current Response for Potential Ranges

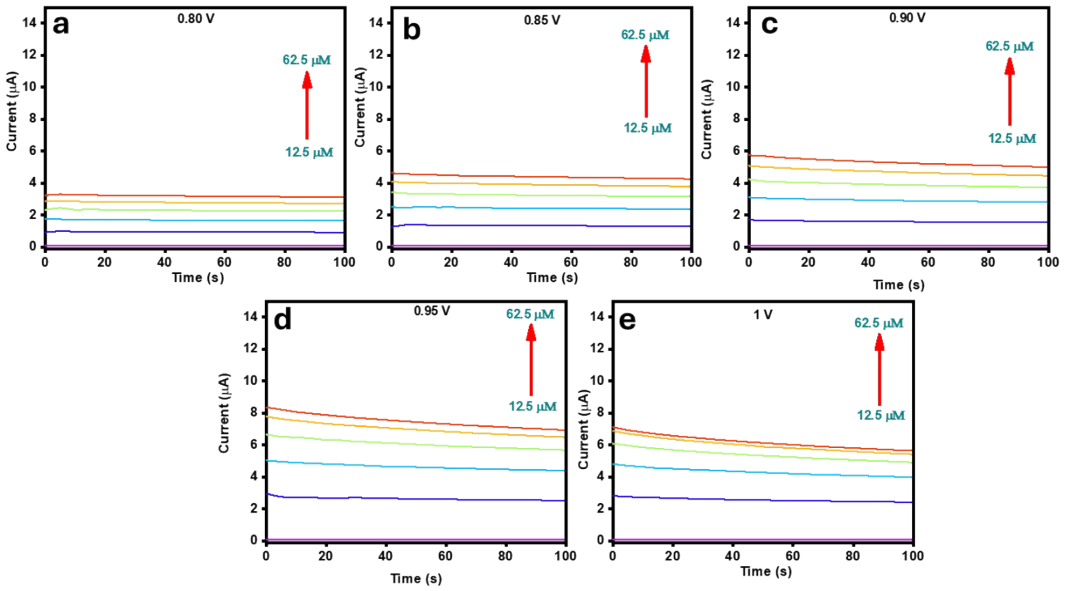


Figure S1. Amperometric response of different potentials in electrolyte solution pH 3.0. (a) 0.80 V, (b) 0.85 V, (c) 0.90 V, (d) 0.95 V, (e) 1.0 V.

S3. Long-Term Stability and Real Sample Analysis

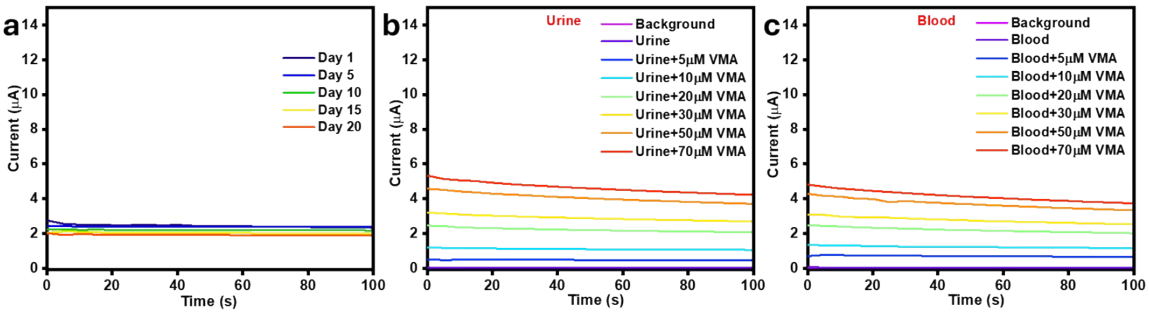
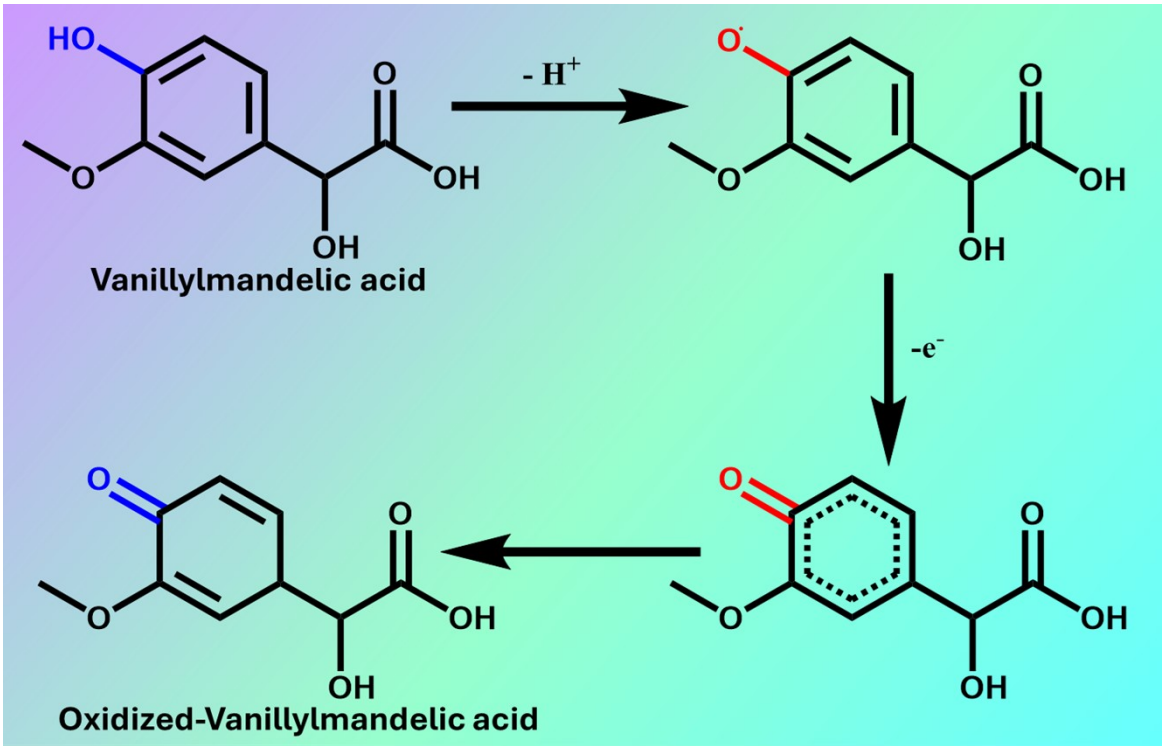


Figure S2. (a) Amperometric curve of NMO@C_3N_5-1:2 for different days, real sample analysis with various spiked concentrations of VMA in (b) urine sample and (c) blood sample.

S4. Mechanism



Scheme S2. Electron transfer in electrochemical mechanism of VMA oxidation.

Table S1. Real sample analysis using NMO@C_3N_5-1:2 /GCE in human blood and urine samples.

Added (µM)	**Blood**		**Urine**	
	Found (µM)	**Recovery(%)**	**Found (µM)**	**Recovery(%)**
0	0	-	0	-
5	4.84	96.8	4.79	95.8
10	9.76	97.6	9.68	96.8
20	18.81	94.04	18.66	93.3

30	28.96	96.43	28.53	95.09
50	47.82	95.64	47.14	94.28
70	67.48	96.36	66.93	95.57