

Supplementary Information

Crumpled Graphene Fully Decorated with Nickel-based Nanoparticles Applied in Glyphosate Detection

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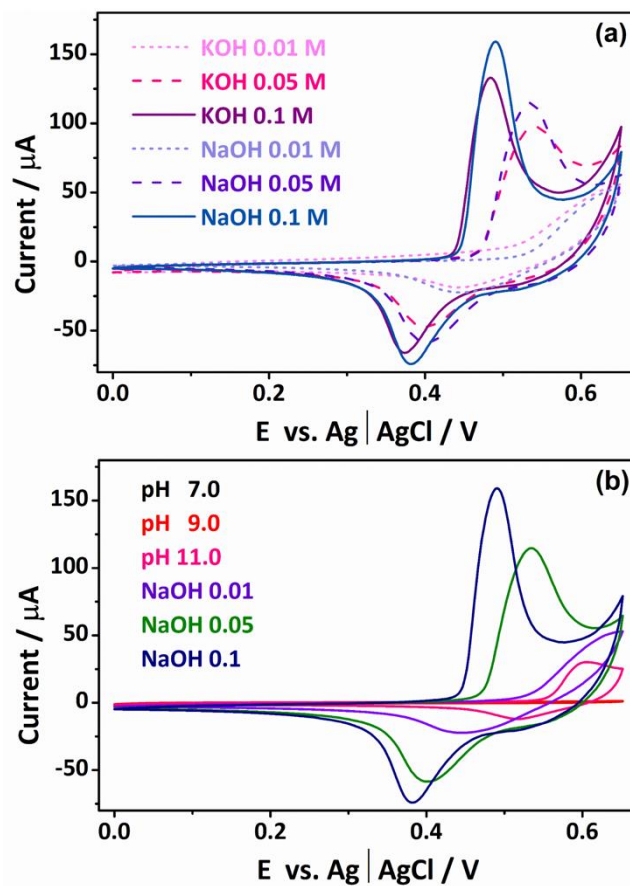


Figure S1 - (a) CV profiles of Ni:CG/GCE at 0.01, 0.05 and 0.1 M of NaOH and KOH respectively. (b) Ni:CG/GCE CV profiles in BR Buffer (0.1 M) and NaOH.

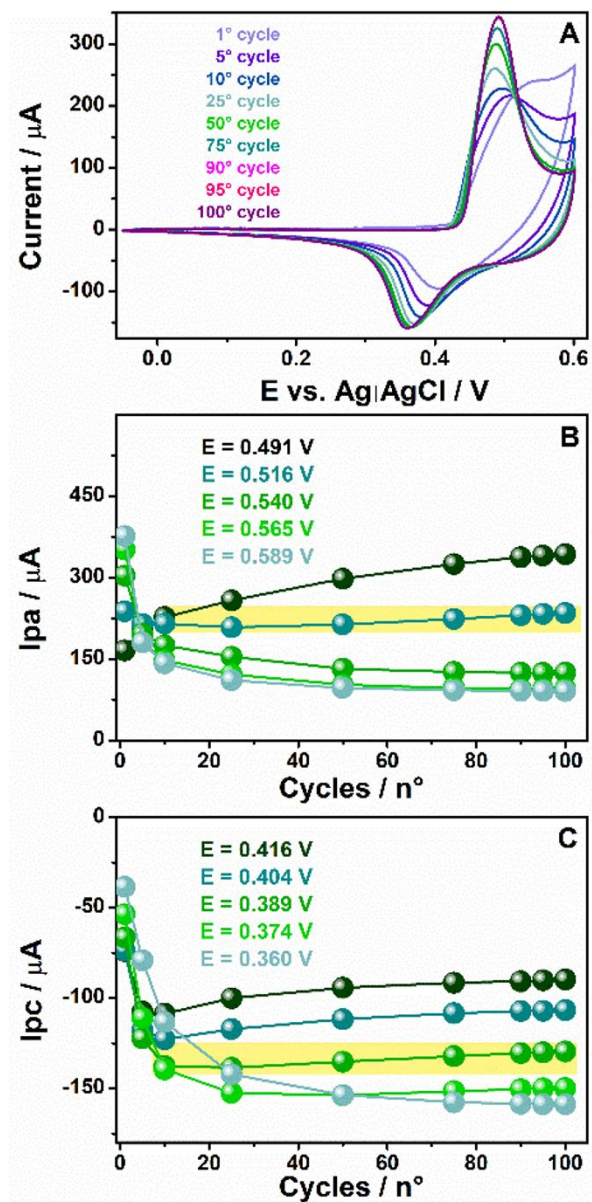


Figure S2 - (a) Cyclic voltammograms at 50 mV s⁻¹ scan rates in 0.1 M NaOH to stabilize the Ni:CG/GCE composite. The inset displays the range for the anodic (b) and cathodic (c) scans.

Table S1. Electrochemical transducer used in sensor development and some current methodologies for Glyp detections.

Summary	Detection Method	LD	Ref.
Carbon coated Ag-Cu-grids	SERS	5.00 μ M	1
BHMH-Cu ²⁺	Fluorescence	0.41 μ M	2
MIP	Amperometric	247 nM	3
GC/rGO-CuNPs	DPV	190 nM	4
FMOG	HPLC-UV	176 nM	5
Au-graphene-paper annealed	Amperometric	85.0 nM	6
nZVI	DPV	76.9 nM	7
NAC single bond Cu ²⁺ complex	Fluorescence	36.0 nM	8
GrO-PE	SWV	17.0 nM	9
PD Product	SERS	14.7 nM	10
HRP/PSF/MWCNT/PGE	Amperometric	14.8 nM	11
SPE/Chi/CNO/TYR	Amperometric	6.50 nM	12
SPE	HPLC-ICP-MS/MS	6.45 nM	13
iTrEnDi	HPLC-MS	5.86 nM	14
NPC	CV	4.00 nM	15
MI-NiAl-LDH	DPV	3.10 nM	16
CG/NiONPs	CV	2.00 nM	This Work
pH-gradient	LC-MS/MS	1.48 nM	17
Reversed phase chromatographic	LC-MS/MS	1.36 nM	18
Derivatization by AQC	UHPLC-ESI-MS/MS	1.18 nM	19

Abbreviations: Limit of detection (LD); Molecularly imprinted polymer (MIP); Surface enhanced Raman scattering (SERS); 2-(benzothiazol)-4-(3-hydroxy-4-methylphenyl) imino phenol (BHMH); Copper nanoparticles and reduced graphene oxide modified a glassy carbon

electrode (GC/rGO-CuNPs); Pre-column Derivation with 9-Fluorenylmethyl Chloroformate (FMOC); Gold nanoelectrode arrays dewetted onto graphene paper (Au-graphene-paper annealed); nanozero-valent iron (nZVI); N-butyl-1,8-naphthalimide-4-hydrazino-6-isopropyl-chromone (NAC); Graphite oxide paste electrode (GrO-PE); Purple Color Dye (PD) Product; Horseradish peroxidase (HRP)/polysulfone (PSF)/ multi-walled carbon nanotube (MWCNT)/Pencil graphite electrodes (PGE) biosensor; Tyrosinase conjugated to carbon nano-ions in a chitosan matrix on a screen-printed electrode (SPE/Chi/CNO/TYR electrodes); Solid phase extraction (SPE); in situ trimethylation enhancement using diazomethane (iTrEnDi); Nanoporous Copper film (NPC); Inorganic-framework molecularly imprinted NiAl layered double hydroxide (MI-NiAl-LDH); 6-aminoquinolyl-N-hydroxysuccinimidyl carbamate (AQC); High-Performance Liquid Chromatography-Ultraviolet (HPLC-UV); High-performance liquid chromatography combined with inductively coupled plasma with triple quadrupole mass spectrometer (HPLC-ICP-MS/MS); High-performance liquid chromatography-mass spectrometry (HPLC-MS); Liquid Chromatography with tandem mass spectrometry (LC-MS-MS); Ultra-High Performance liquid chromatography–electrospray ionization multiple reaction monitoring tandem mass spectrometry; Differential Pulse Voltammetry (DPV); Square wave voltammetry (SWV); Cyclic voltammetry (CV).

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