Electronic Supplementary Material (ESI) for Analyst.

Supporting Information

Hierarchical core–shell structured $Ni_3S_2/NiMoO_4$ nanowires: A high-performance and reusable electrochemical sensor for glucose detection

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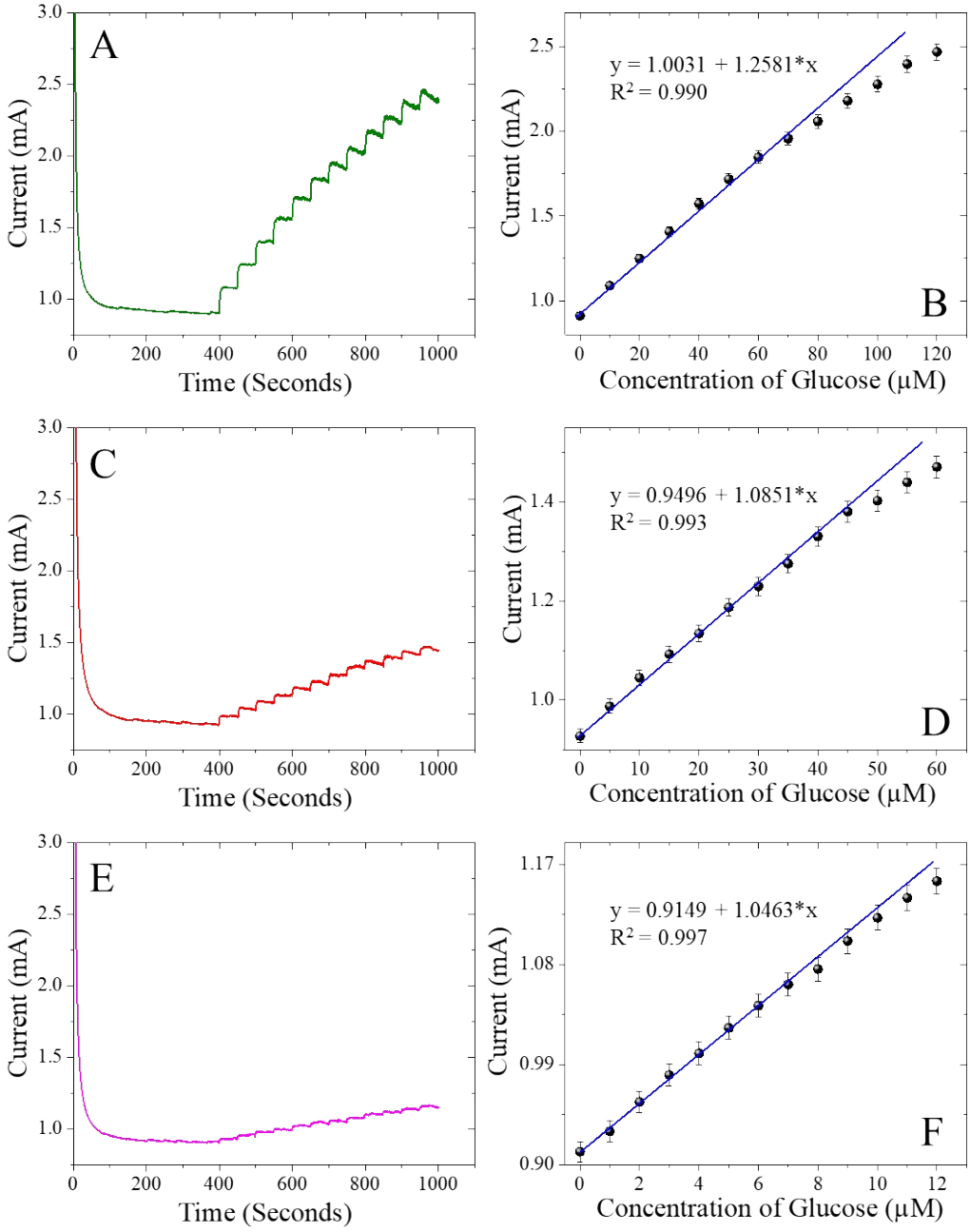

Figure S1. Amperometric *i-t* curve response obtained for the hierarchical core-shell Ni-Ni_3S_2/$NiMoO_4$ nanowires electrode in 0.5 M NaOH with the successive steps addition of 10 µM (A), 5 µM (A) 1 µM (A) glucose under constant stirring condition, and the corresponding calibration plots (B, D, and F) obtained by plotting amperometric current response vs. concentrations of the glucose (B). The applied potential is 0.50 V

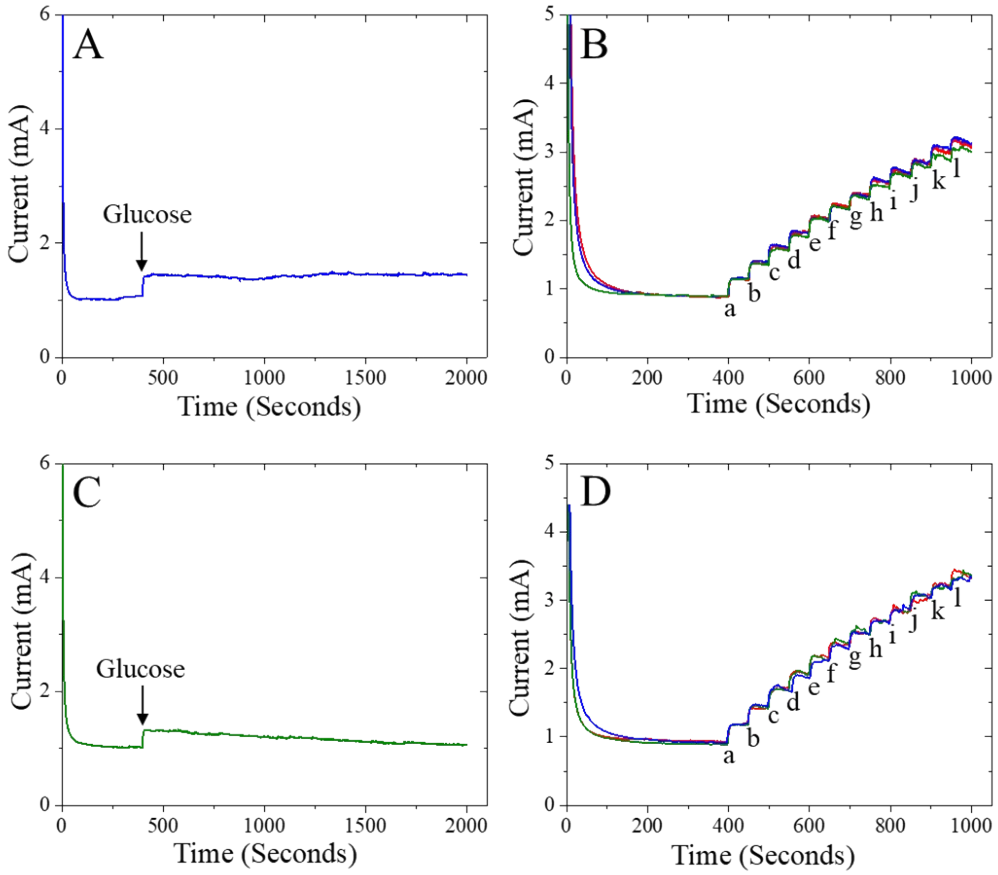

Figure S2. Stable amperometric *i-t* curve response obtained for the freshly prepared (A), and 10 days old (C) hierarchical core-shell Ni-Ni_3S_2/$NiMoO_4$ nanowires electrode in 0.5 M NaOH with an addition of 20 μM glucose (A) under constant stirring condition, and the amperometric *i-t* curve responses obtained for three freshly prepared (B), and 10 days old (D) hierarchical core-shell Ni-Ni_3S_2/$NiMoO_4$ nanowires electrode in 0.5 M NaOH with the successive addition of 20 μM glucose under constant stirring condition. The applied potential is 0.50 V

Table S1. Comparison of the LOD of as-fabricated glucose sensor versus other Ni, Ni_3S_2 and $NiMoO_4$ based nanostructured materials.

Nanomaterials	Linear Range	Sensitivity	LOD & References
3D Ni_3S_2 Nanosheet Arrays	0.005-3.0 mM	6148.0 μA mM^{-1} cm^{-2}	1.2 μM [1]
Ni_3S_2/MWCNT-NC	30-500 μM	3345 μA mM^{-1}	1.0 μM [2]
Ni_3S_2/IL-Graphene/GCE	0-500 μM	25.343 μA μM^{-1} cm^{-1}	0.161 μM [3]
α-$NiMoO_4$ Nanoparticles	0.005-0.105 mM	0.208 μA μM^{-1} cm^{-2}	0.935 μM [4]
□-$NiMoO_4$ Nanoparticles	0.005-0.105 mM	1.054 μA μM^{-1} cm^{-2}	0.914 μM [4]
$NiMoO_4$ Nanorods	0.05-14 mM	0.3899 mA mM^{-1} cm^{-2}	0.36 μM [5]
$NiMoO_4$ Nanofibers	0.01-8 mM	0.1938 mA mM^{-1} cm^{-2}	4.6 μM [6]
$NiMoO_4$ NSA	0.001-0.9 mM	4.13 mA mM^{-1} cm^{-2}	1.0 μM [7]
$Ni(OH)_2$/3D Graphene	0.001-1.17 mM	2.65 mA mM^{-1} cm^{-2}	0.34 μM [8]
NiO Superstructures	0.018-1.2 mM	0.395 mA mM^{-1} cm^{-2}	6.15 μM [9]
Hierarchical $Ni(OH)_2$ Hollow Nanorods	0.002-3.86 mM	2.904 mA mM^{-1} cm^{-2}	0.6 μM [10]
$NiCo_2O_4$ Nanoarrays	0.001-0.63 mM	4.12 mA mM^{-1} cm^{-2}	0.5 μM [11]
3-D $NiMoO_4$ Cactus-like Nanoparticles	1-4000 μM	1.32 μA μM^{-1} cm^{-2}	0.163 μM *
3-D Ni_3S_2 Nanowires	1-4000 μM	5.72 μA μM^{-1} cm^{-2}	0.104 μM *
3-D Ni_3S_2 / $NiMoO_4$ Core-Shell Nanowires	1-4000 μM	10.49 μA μM^{-1} cm^{-2}	0.055 μM *

* This work

Table S2. Comparison table displaying the glucose concentration values obtained using commercially available glucometer and 3-D hierarchical core-shell Ni-Ni_3S_2/$NiMoO_4$ nanowires electrode in human blood serum samples.

Sample Numbers	Concentration of glucose determined using commercially available glucometer (mM)[1]	Concentration of glucose determined by proposed method (mM±SD)[2]	Relative standard deviation (% RSD)[3]
1	1	0.97±0.09	3.00
2	2	1.93±0.11	3.50
3	3	2.89±0.12	3.67
4	4	3.86±0.11	3.50
5	5	4.82±0.12	3.60
6	6	5.78±0.13	3.66

[1] The detection of glucose by commercial available glucometer in blood serum samples.
[2] The detection of glucose using 3-D hierarchical core-shell Ni-Ni_3S_2/$NiMoO_4$ nanowires electrode in blood serum samples.
[3] The relative standard deviation (RSD) was calculated from at least three observed values for every sample in order to establish the repeatability.

Table S3. Comparison table showing the low-level glucose concentration values obtained using 3-D hierarchical core-shell Ni-Ni_3S_2/$NiMoO_4$ nanowires electrode in human blood serum samples.

Sample Numbers	Concentration of glucose injected (µM)	Concentration of glucose measured (µM±SD)	Relative standard deviation (% RSD)[1]
1	20±0.20	19.5±0.21	2.50
2	40±0.28	38.9±0.32	2.75
3	60±0.33	58.2±0.35	3.16
4	80±0.39	77.4±0.41	3.25
5	100±0.42	96.5±0.43	3.50
6	120±0.47	115.1±0.49	4.08

[1] *The relative standard deviation (RSD) was calculated from at least three observed values for every sample in order to establish the repeatability.*

References

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