

### Supplementary Data

**Disposable non-enzymatic electrochemical glucose sensors based upon screen-printed graphite macroelectrodes modified via a facile methodology with Ni, Cu, and Ni/Cu hydroxides are shown to accurately determine glucose in real human serum blood samples**

Mohamed L. Chelaghmia<sup>a,\*</sup>, Hassina Fisli<sup>b</sup>, Mouna Nacef<sup>a</sup>, Dale A. C. Brownson<sup>c</sup>, Abed M. Affoune<sup>a</sup>, Hamid Satha<sup>d</sup> and Craig E. Banks<sup>c</sup>

<sup>a</sup> Laboratory of Industrial Analysis and Materials Engineering, University May 8, 1945 Guelma, PO.B 401, Guelma 24000, Algeria

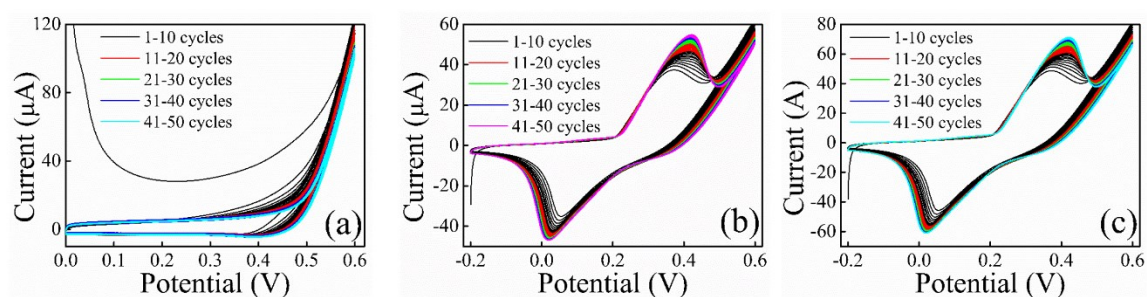
<sup>b</sup> Laboratory of Applied Chemistry, University May 8, 1945 Guelma, PO.B 401, Guelma 24000, Algeria

<sup>c</sup> Faculty of Science and Engineering, Manchester Metropolitan University, Chester Street, Manchester M1 5GD, UK

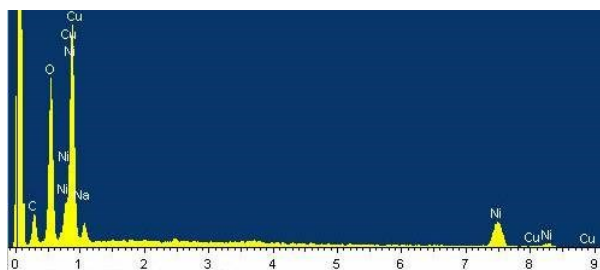
<sup>d</sup> Laboratory of Silicates, Polymers and Nanocomposites, University May 8, 1945 Guelma, PO.B 401, Guelma 24000, Algeria

**Table S1** The proposed surface modified SPEs as an impedimetric non-enzymatic sensor in comparison with previous reported

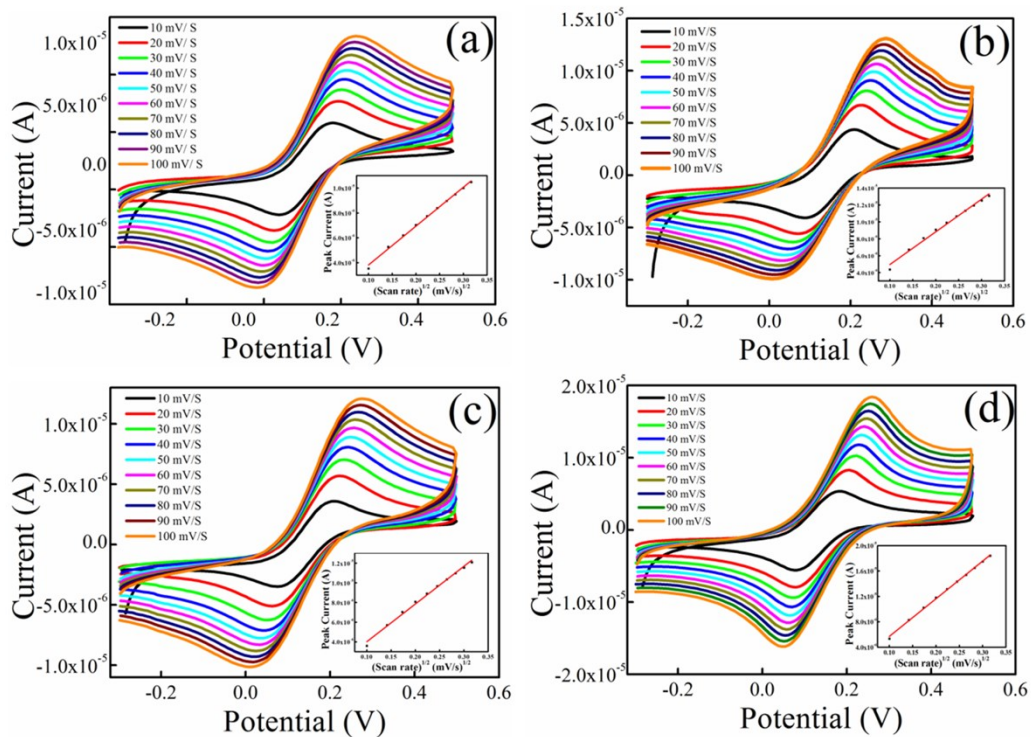
Modified electrode	Sensitivity	Linear range (mM)	LOD ( $\mu\text{M}$ )	Reference
FTO/Nano-NiO/GOx	4.45 $\text{k}\Omega/\text{mM}$	0.2 – 4	24	[36]
$\text{Ni}(\text{OH})_2/\text{AuNp}/\text{SPE}$	0.073 $\text{k}\Omega^{-1}/\text{mM}$	0.1 – 2	40	[37]
$\text{Ni}(\text{OH})_2/\text{SPE}$	0.137 $\text{k}\Omega^{-1}/\text{mM}$	0.1 – 2	315	[38]
$\text{EAuNi}(\text{OH})_2$	0.4847 $\text{k}\Omega/\text{mM}$	0.1 – 2	370	[39]
$\text{Ni}(\text{OH})_2/\text{SPE}$	0.168 $\text{k}\Omega^{-1}/\text{mM}$	0.1 – 4	53	This work
$\text{Cu}(\text{OH})_2/\text{SPE}$	0.475 $\text{k}\Omega^{-1}/\text{mM}$	0.2 – 10	51	This work
$\text{Ni}(\text{OH})_2/\text{Cu}(\text{OH})_2/\text{SPE}$	0.705 $\text{k}\Omega^{-1}/\text{mM}$	0.1 – 5	40	This work



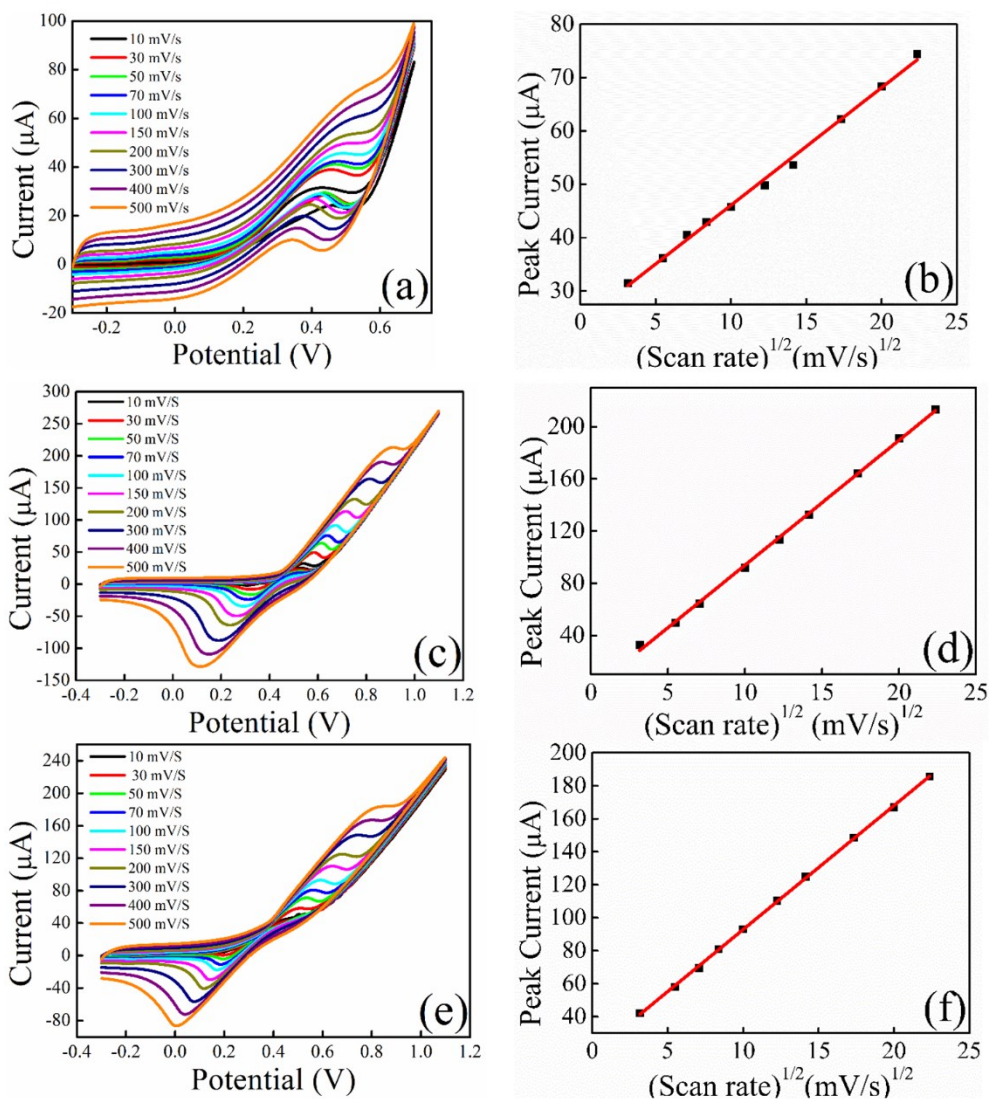
**Fig. S1** CVs during the growth process of the (a)  $\text{Cu}(\text{OH})_2$ , (b)  $\text{Ni}(\text{OH})_2$ , and (c)  $\text{Ni}(\text{OH})_2/\text{Cu}(\text{OH})_2$  on the working electrodes surfaces in a 0.1 M NaOH solution, scan rate  $50 \text{ mVs}^{-1}$ .



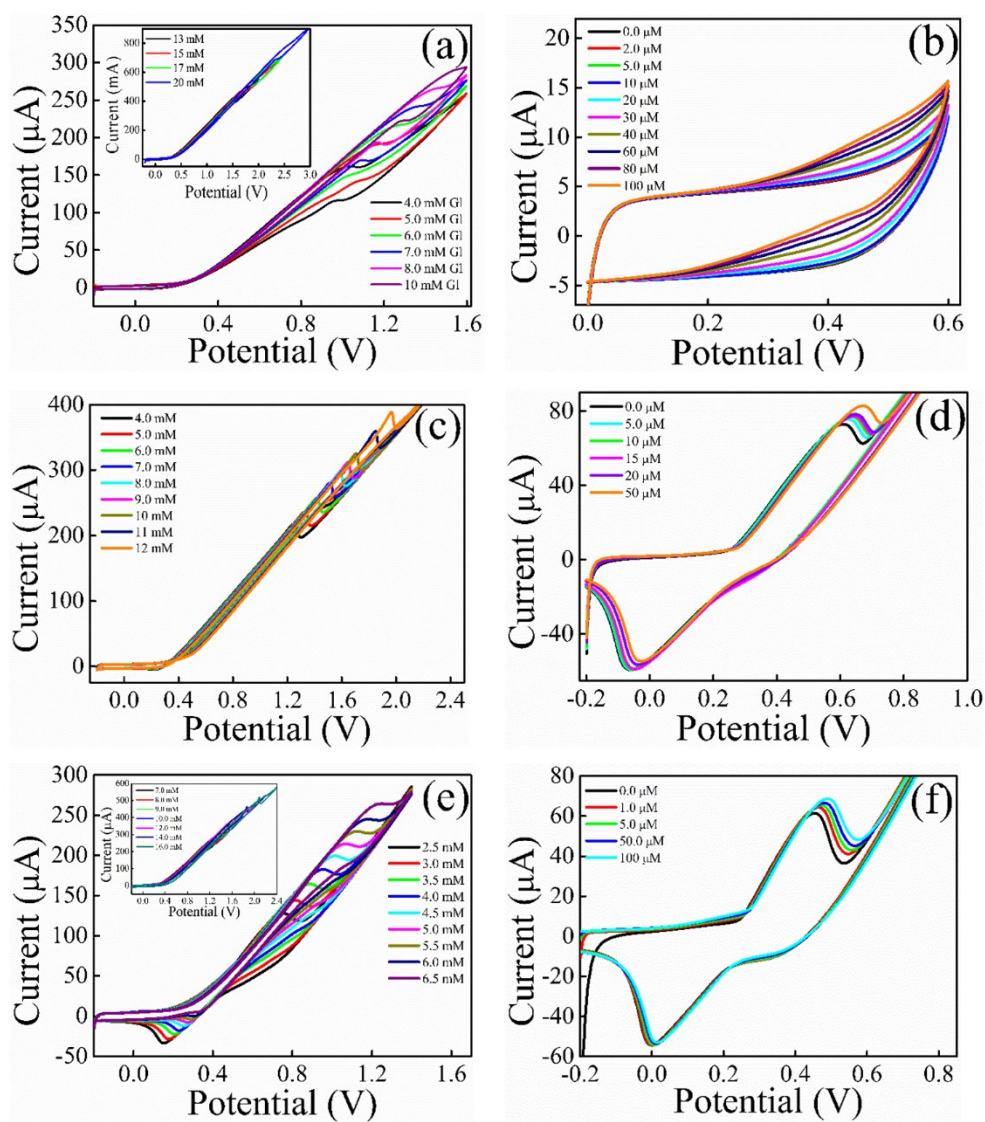
**Fig. S2** EDX spectrum of Ni/Cu modified SPE after electrochemical activation.



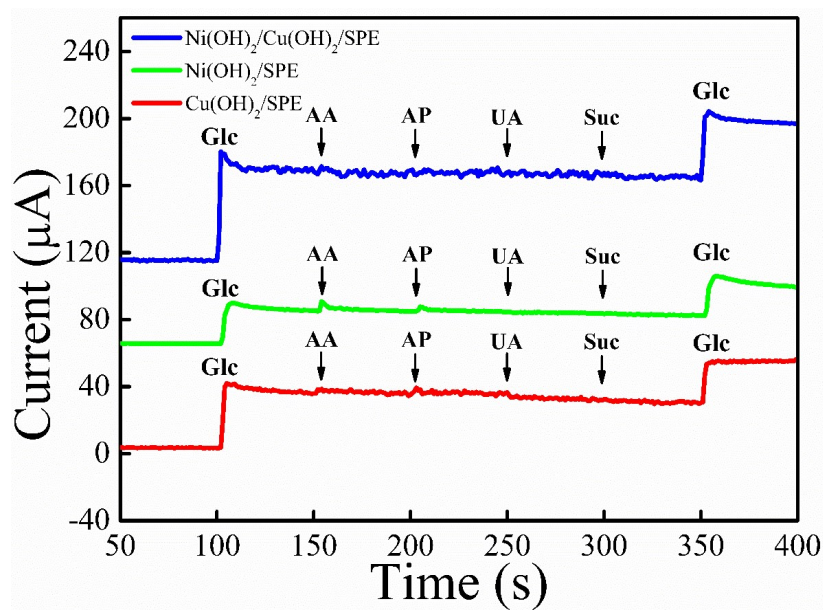
**Fig. S3** CV curves of  $0.5 \text{ mM } Fe(CN)_6^{3-/4-}$  in  $0.1 \text{ M KCl}$  at (a) unmodified SPEs, (b)  $Ni(OH)_2/SPE$ , (c)  $Cu(OH)_2/SPE$  and (d)  $Ni(OH)_2/Cu(OH)_2/SPE$ , at scan rates in the range of  $0.01\text{--}0.1 \text{ V s}^{-1}$ . [Inset: Analysis of corresponding anodic peak current as a function of square root of scan rate]



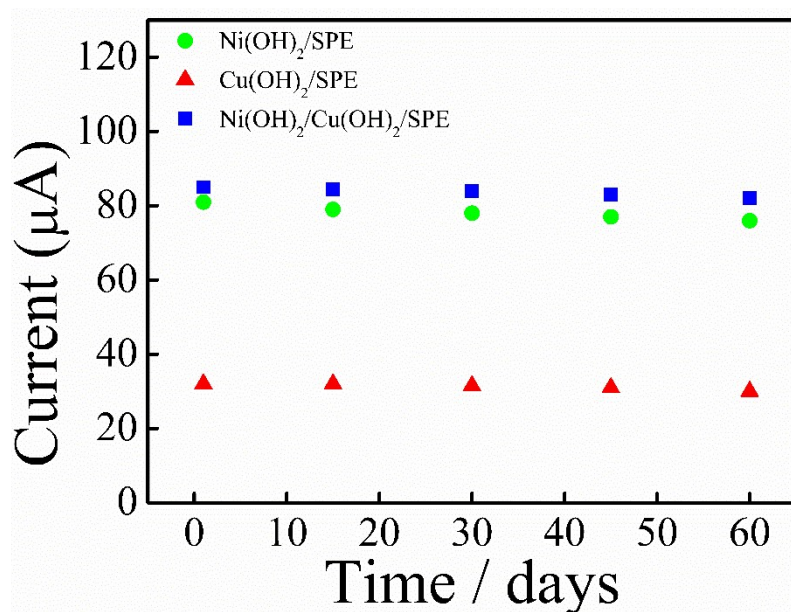
**Fig. S4** CV curves of 0.5 mM glucose in 0.1 M NaOH using (a) Cu(OH)<sub>2</sub>/SPE, (c) Ni(OH)<sub>2</sub>/SPE and (e) Ni(OH)<sub>2</sub>/Cu(OH)<sub>2</sub>/SPE all obtained at scan rates over the range 10–500 mV s<sup>-1</sup>. (b, d, f) Analysis of corresponding anodic peak current versus of square root of scan rate.



**Fig. S5** CVs obtained for higher and lower glucose concentrations on (a, b)  $\text{Cu}(\text{OH})_2/\text{SPE}$ , (c, d)  $\text{Ni}(\text{OH})_2/\text{SPE}$  and (e, f)  $\text{Ni}(\text{OH})_2/\text{Cu}(\text{OH})_2/\text{SPE}$  acquired in 0.1 M NaOH.



**Fig. S6** Anti-interference curve of modified SPEs with the successive additions of 1.0 mM glucose and 0.1 mM interferents including ascorbic acid (AA), acetaminophen (AP), uric acid (UA), and sucrose (Suc) into 0.1M NaOH at an applied potential of +0.5 V



**Fig. S7** The detection stability of the proposed electrode for glucose tested at intervals of fifteen days for two months.