Electronic Supplementary Material (ESI) for Analytical Methods

Non-enzymatic Glucose Sensor Based on Three Dimensional Nickel Oxide for Enhanced Electrochemical Performance

Experimental Section

Nickel foam (NF) (thickness: 1.8 mm, pore density: 110 ppi) was purchased from Changsha Keliyuan and used as the scaffold. $Ni(NO_3)_2 \cdot 6H_2O$, β-D-glucose, ascorbic acid, fructose, lactose and other reagents were of analytical grade and used without further purification. Ultrapure water (18.2 MΩ/cm) generated by a Kangming Aike water system was used throughout the work.

Before electrodeposition, NF (approximately 1 cm × 3 cm) was firstly cleaned with acetone and hydrochloric acid (1:2) in an ultrasound bath for 10 min, in order to remove the organics and the oxide layer on the surface, respectively, and then rinsed with ultrapure water and absolute ethanol. The electrodeposition was conducted by a CHI660a electrochemical workstation with a three-electrode cell consisting of a Saturated Calomel Electrode (SCE) as reference electrode, a 2.0 cm × 2.0 cm platinum plate as counter electrode and the treated NF with an effective geometric area of 1 cm × 1 cm as the working electrode $Ni(OH)_2$ was firstly deposited at a constant potential of -0.7 V vs. SCE in the aqueous solution of 0.1 M $Ni(NO_3)_2$ through controlling the quality of electric charge to be 0.06C, and then the as-prepared sample was washed with ultrapure water several times. Finally it was annealed at 300 °C for 3 h to make a fully transformation of α-$Ni(OH)_2$ to NiO.

The electrochemical properties of NiO/NF electrode were investigated in 0.5 M NaOH solution using a three-electrode system with the prepared NiO/NF as working

electrode, a 2.0 cm × 2.0 cm platinum plate as auxiliary electrode and a standard Hg/HgO electrode as a reference electrode. Before the use of NiO/NF electrode, it should be activated by immersed into the electrolyte for a few minutes followed by scans of Cyclic Voltammetry (CV) at a range from -0.05 V to 0.85 V. The current response was evaluated by constant potential chornoamperometry. In the test of stability the sensor was stored in a refrigerator to keep a constant temperature condition. Meanwhile, the current response test was taken every day. All electrochemical experiments were conducted with CHI660a workstation at room temperature.

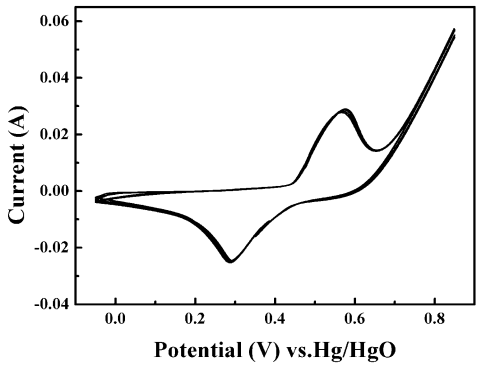

Fig. S1. Cyclic voltammetric scans of 3D NiO/NF electrode in 0.5 M NaOH solution at 20 mV/s for six cycle numbers.

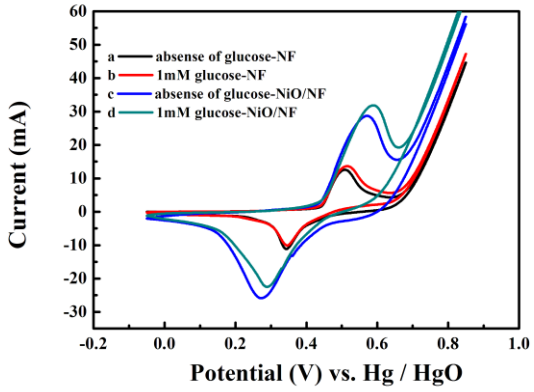

Fig. S2 The CVs of NF electrode(a, b) and NiO/NF electrode(c, d)

Table S1 Comparison of various non-enzymatic glucose sensors

electrode	**Liner range(mM)**	**Detection limit(μM)**	**Sensitivity(μA/ (mM·cm2))**	**References**
Ni-MWNTs/GCE	0.0032-17.5	0.89	67.19	6
NiNWAs	0.0005-7	0.1	1043	25
NiO–Au nanobelt		1.32	48.35	24
GC/MWCNT/NiO	0.2-12	0.16		23
Nano NiO	0.001-0.11	0.16	55.9	7
Cu–NiO/GCE	0.0005-5	0.5	171.8μA/mM	26
NiO–CdONFs/GCE	up to 6.37	0.35	212.71	22
NiO/NF	0.005-5.5	0.46	6657.5	This work

Table S2. The detection of glucose in human serum samples.

Blood samples	C_G measured in local hospital (mM)	C_G measured by our sensor (mM)	Added glucose (mM)	Glucose concentration after added (mM)	Recovery (%)
1	4.07	4.00	2.00	6.03	102
2	4.63	4.87	2.00	6.83	98
3	4.68	4.85	2.00	6.80	97
4	4.52	4.56	2.00	6.62	103

C_G: Glucose concentration in serum samples