

Supporting Information

Facile Fabrication of NiO Decorated Double-Layer SWCNTs

Buckypaper for Glucose Detection

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XPS spectra

XPS analysis was done for the O 1s region of 2 samples: as-prepared NiO-BP (a-NiO) and NiO-BP soaked in 0.4 M NaOH (b-NiO). After being calibrated by setting the C 1s peak to 284.8 eV, the O 1s spectra were subtracted using a Shirley-type background. For each spectrum, the area ratio of the component peaks at 529.3, 531.1 and 532.8 eV from NiO was fixed at 69:29:2 (20% Lorentzian-80% Gaussian) following the article by Biesinger et al.¹ As shown in Figure S1 and Table S1, hydroxide peak at 531.3 eV can be observed for both samples and the relative area of this peak is larger for b-NiO. The result reveals that the surface of NiO nanoparticles on buckypaper was converted to Ni(OH)₂ when they were dispersed in water during the fabrication process and they were further hydroxylated in NaOH solution.

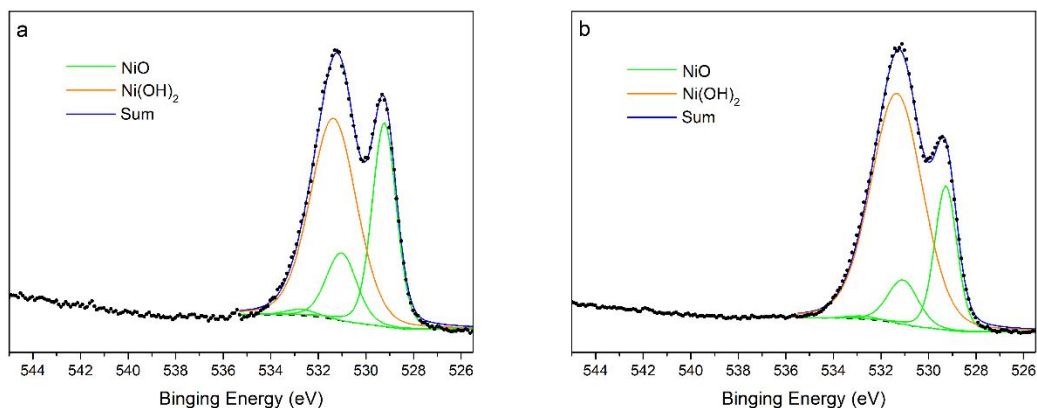


Figure S1. XPS spectra of the O 1s region for (a) a-NiO and (b) b-NiO.

Table S1. Spectral fitting parameters of O 1s.

Sampl	Peak 1	% area	Peak 2	% area	Peak 3	% area	Peak 4	% area
e	(eV)		(eV)		(eV)		(eV)	
a-NiO	529.3	29.8	531.1	12.5	531.3	56.6	532.8	1.1
b-NiO		19.4		8.1		71.9		0.6

FTIR absorption spectra

The electrooxidation product of glucose was dried under vacuum and characterized by FTIR. C=O stretching vibration modes from gluconate and glucolactone are observed at 1635 cm^{-1} and 1729 cm^{-1} , respectively. Positions of both peaks are consistent with the spectra recorded in Spectral Database for Organic Compounds (SDBS Nos. 2567 and 2533), indicating that glucose was finally oxidized into glucolactone/gluconate.

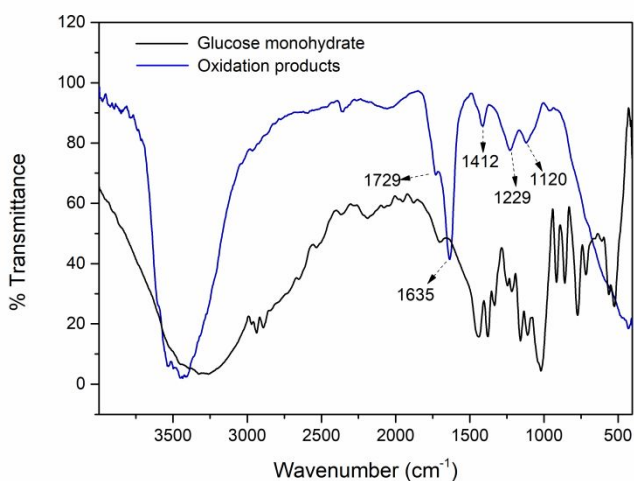


Figure S2. FTIR absorption spectra of glucose and its oxidation products.

Table S2. Peak assignments for the FTIR absorption spectrum of glucose oxidation products.

Peak position (cm^{-1})	Vibration Mode	Assignment
1635	$\nu_{\text{C}=\text{O}}(-\text{COO}^-)$	gluconate
1729	$\nu_{\text{C}=\text{O}}(-\text{COO}-)$	glucolactone
1120, 1229	ν_{CO}	glucolactone/gluconate
1412	δ_{OH}	glucolactone/gluconate
3300–3600	ν_{OH}	glucolactone/gluconate

Reference:

(1) Biesinger, M. C.; Payne, B. P.; Grosvenor, A. P.; Lau, L. W.; Gerson, A. R.; Smart, R. S. C. Resolving Surface Chemical States in XPS Analysis of First Row Transition Metals, Oxides and Hydroxides: Cr, Mn, Fe, Co and Ni. *Appl. Surf. Sci.* **2011**, *257*, 2717-2730.