Electronic Supplementary Material

Carboxylic-group-functionalized single-walled carbon nanohorns as peroxidase mimetics and their application to glucose detection

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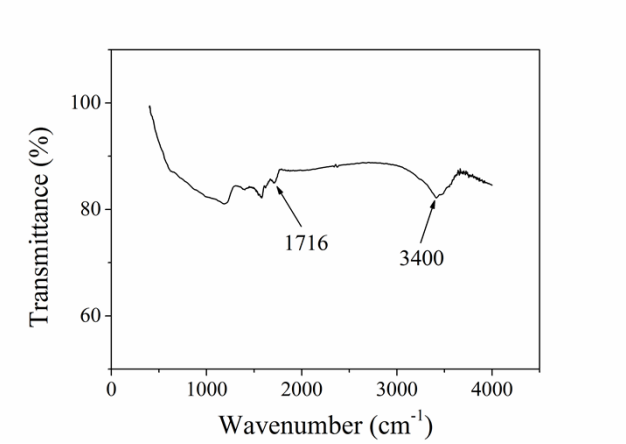

Fig. S1 FTIR spectra of SWCNHs-COOH.

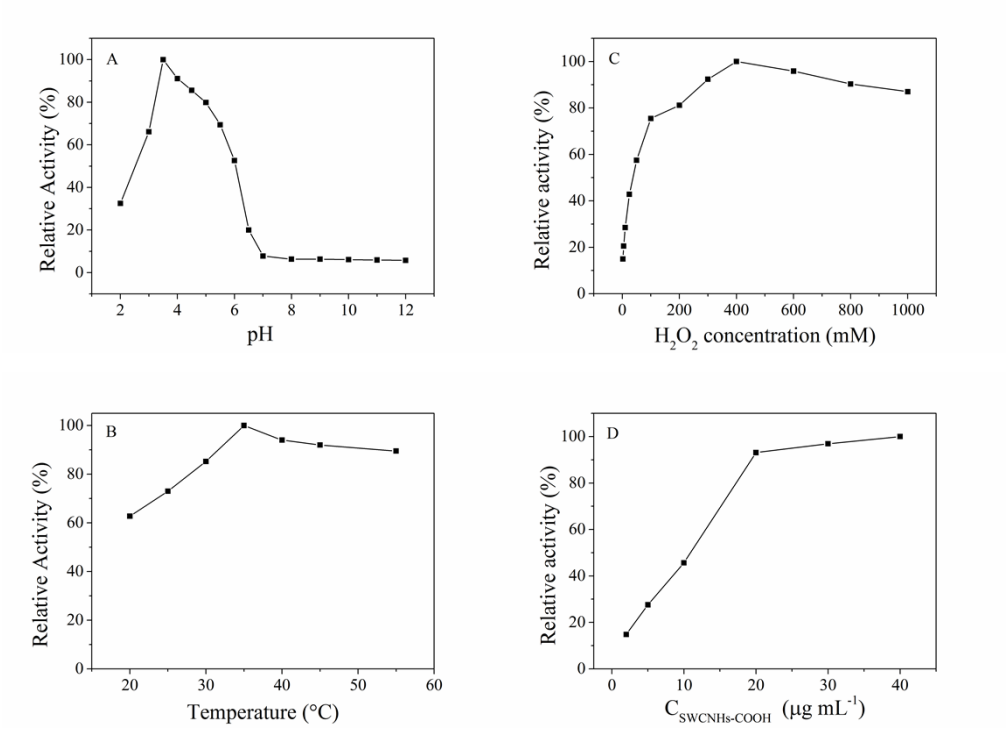

Fig. S2 Dependence of the SWCNHs-COOH peroxidase-like activity on A) pH, B) temperature, C) H_2O_2 concentrations, and D) SWCNHs-COOH concentrations. Experiments were carried out using 20 μg mL^{-1} SWCNHs-COOH in 500 μL of 0.1 M phosphate buffer with 0.8 mM TMB as substrate. The concentration of H_2O_2 was 100 mM at pH 3.5 and 35 ºC unless otherwise stated. The maximum point in each curve was set as 100%.

Table S1 Comparison of the apparent Michaelis-Menten constant (K_m) and maximum reaction rate (V_{max}) between SWCNHs-COOH and other enzyme mimics

Catalyst	Substrate	K_m (mM)	V_{max} (10^{-8} M S^{-1})	Reference
SWCNHs-COOH	H_2O_2	49.8	2.07	Present work
	TMB	0.506	2.28	
HRP	H_2O_2	3.70	8.71	1
	TMB	0.434	10.0	
HCNTs	H_2O_2	0.02	-	2
	TMB	41.42	-	
C-Dots	H_2O_2	26.77	30.61	3
	TMB	0.039	3.61	
GO-COOH	H_2O_2	3.99	3.85	4
	TMB	0.0237	3.45	
$C_{60}[C(COOH)_2]_2$	H_2O_2	24.58	4.011	5
	TMB	0.2333	3.473	

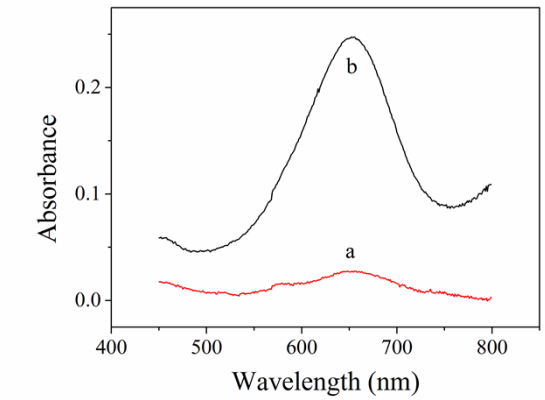

Fig. S3 Typical absorption spectra of the colorimetric method by using GOx and SWCNHs-COOH catalyzed color reaction in the absence (a) and the presence (b) of 2 mM glucose.

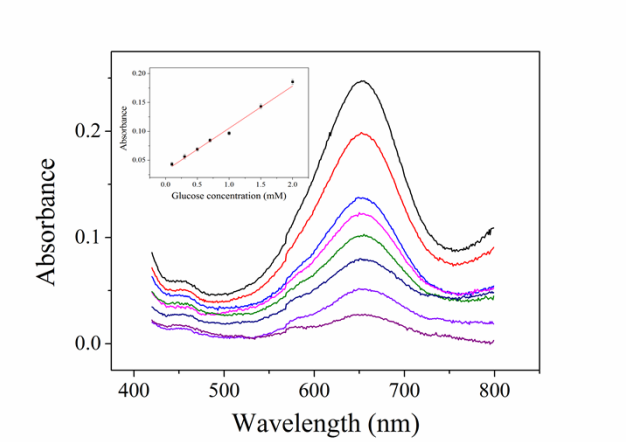

Fig. S4 Typical absorption spectra of the colorimetric method by using GOx and SWCNHs-COOH catalyzed color reaction in the absence of 0, 0.1, 0.3, 0.5, 0.7, 1.0, 1.5, 2.0 mM glucose. Inset: the linear calibration plot for glucose determination. The error bars represent the standard deviation of the three measurements.

Table S2. Comparison of colorimetric methods based on enzyme mimics for glucose detection.

Enzyme mimics	Linear range (μM)	Detection limit (μM)	Refs.
SWCNHs-COOH	100-2000	100	Present work
HCNTs	0.5-115	0.12	2
C-Dots	1-500	0.4	3
GO-COOH	1-20	1	4
$C_{60}[C(COOH)_2]_2$	1-40	0.5	5

References

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