Supplementary Material

A novel label-free electrochemical immunosensor for the detection of Hepatitis B surface antigen

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Table S1 Comparison of different methods for the detection of HBsAg

Methods	Linear range	Limit of detection	References
Chemiluminescence immunosassay	0.12-30 ng/mL	14 pg/mL	1
Piezoelectric diaphragm-based immunoassay	0.01-10000ng/mL	0.1 ng/mL	2
Electrochemical Impedance immunoassay	0.1-70 ng/mL	0.06 ng/mL	3
Sandwich-type Electrochemical immunoassay	0.0005-20 ng/mL	0.2 pg/mL	4
Label-free Electrochemical immunoassay	1-6 ng/mL	0.03 ng/mL	5
Label-free Electrochemical immunoassay	0.001-80 ng/mL	0.31 pg/mL	Present work

Table S2 Comparison with other sandwich-type electrochemical immunosensor using different nanomaterials

Nanomaterials	Linear range	Limit of detection	Reference
HA-NH$_2$-CNT/NH$_2$-CNT/ HBsAg	1-6 ng/mL	0.03 ng/mL	5
GCE/Au/Ab$_1$/BSA/HBsAg/Pd/ δ-MnO$_2$/HNTs	0.001-20 ng/mL	0.3 pg/mL	6
GCE/NPG/Ab/BSA/ HBsAg/AuNP-Ab-HRP	0.01-1.0 ng/mL	2.3 pg/mL.	7
GCE/MNP-Ab/HBsAg/Ab-HRP	0.001-0.015ng/mL	0.9 pg/mL	8
GCE/NiAuPt-NGs/Ab/BSA/ HBsAg/	0.001-80 ng/mL	0.31 pg/mL	Present work

Table S3 Determination of HBsAg in human serum samples

Initial HBsAg concentration in sample (ng/mL)	Added HBsAg concentration (ng/mL)	Measured concentration after addition (ng/mL)	Average value (ng/mL)	RSD (%,n =5)	Recovery (%,n =5)
	1.0	1.43, 1.47, 1.41, 1.53, 1.59	1.49	4.98	98.0
0.51	5.0	5.27, 5.43, 5.69, 5.57, 5.38	5.47	3.01	99.2
	10.0	10.81,10.38,10.09, 10.24, 10.73	10.45	2.97	99.4

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