Supplementary materials

Ultrasensitive label-free electrochemical immunosensor based on multifunctionalized graphene nanocomposites for the detection of alpha fetoprotein

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Table S1 Comparison of different methods for the detection of AFP

Method	Linear range	Detection limit	Reference
Label-free electrochemiluminescence immunosensor	0.0005 ~ 50 pg/mL	0.2 fg/mL	1
Sandwich-type electrochemiluminescence immunosensor	0.005 ~ 0.2 pg/mL	1.0 fg/mL	2
Label-free electrochemical immunosensor	0.00005 ~ 250 ng/mL	1.1 fg/mL	3
Sandwich-type electrochemical immunosensor	0.0001 ~ 50 ng/mL	33 fg/mL	4
Sandwich-type electrochemical immunosensor	0.0001 ~ 10 ng/mL	0.05 pg/mL	5
Label-free electrochemical impedance spectroscopy immunosensor	1 ~ 100 pg/mL	0.1 pg/mL	6
Label-free electrochemical immunosensor	0.001 ~ 45 ng/mL	0.13 pg/mL	7
Sandwich-type electrochemical immunosensor	0.001 ~ 5 ng/mL	0.2 pg/mL	8
Sandwich-type electrochemical immunosensor	0.01 ~ 60 ng/mL	1.6 pg/mL	9
Label-free electrochemiluminescence immunosensor	0.005 ~ 14 ng/mL	2.0 pg/mL	10
Sandwich-type electrochemical immunosensor	0.01 ~ 40 ng/mL	2.3 pg/mL	11
Label-free electrochemiluminescent immunosensor	0.01 ~ 100 ng/mL	3.3 pg/mL	12
Label-free electrochemical immunosensor	0.01 ~ 75 ng/mL	4.0 pg/mL	13
Label-free electrochemical immunosensor	0.01 ~ 12 ng/mL	5.0 pg/mL	14
Sandwich-type electrochemical immunosensor	0.05 ~ 30 ng/mL	5.0 pg/mL	15
Competitive electrochemical immunosensor	0.05 ~100 ng/mL	5.0 pg/mL	16
Label-free photoelectrochemical immunosensor	0.1 ~ 500 ng mL	10 pg/mL	17
Label-free electrochemical immunosensor	0.1 ~ 30 ng mL	18 pg/mL	18
Sandwich-type electrochemiluminescence immunosensor	0.05 ~ 50 ng/mL	30 pg/mL	19
Sandwich-type electrochemical immunosensor	0.5 ~ 80 ng/mL	250 pg/mL	20
Label-free electrochemical immunosensor	0.00001 ~10.0 ng/mL	2.7 fg/mL	This method

Table S2 Human serum sample analysis using the designed method and the ELISA method

Sample	This method (ng/mL) [a]	ELISA (ng/mL) [a]	Relative error (%)
1	2.22	2.14	3.7
2	4.42	4.65	-4.9
3	7.52	7.23	4.0

[a] Each value is the average of five measurements.

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