Electronic Supporting Information (ESI)

Application of a SERS-based Lateral Flow Immunoassay Strip for Rapid and Sensitive Detection of Staphylococcal Enterotoxin B

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List of Contents

Fig. S1 Characterizations of HGNs: (a) transmission electron microscope (TEM) images, (b) UV/Vis absorption spectrum and (c) dynamic light scattering distribution of HGNs.

Fig. S2 Dynamic light scattering distributions for (a) physically adsorbed HGNs and (b) chemically conjugated HGNs. The photographic image indicates that chemically conjugated HGNs are favorable for the formation of sandwich immunocomplexes on the LFA strip.

Fig. S3 (a) Calibration curves for ELISA and SERS-based assays. Four parameter logistic fitting equation have been used to obtain the fitting parameters. (b) Linear fitting line for SERS-based assay in the low concentration range.

Fig. S4 Photographic and SERS mapping images of a SERS-based strip biosensor in the presence of SEB, staphylococcus aureus enterotoxin A (SEA), ochratoxin, aflatoxin, and fumonisin: the test zone changed to red only when SEB was present. In addition, SERS mapping image could be also observed only for SEB.

Fig. S5 SERS mapping (a) and photographic (b) images for low concentrations of SEB (500, 100, 50, 10 and 1 ng/mL). Non-specific binding effects were tested for the antigen cocktail solution composed of five different antigens. (c) Assay results quantified via calculations from the calibration fitting curve in Fig 5a.
Figure S1

(b) Abs$_{\text{max}}$=527

(c) Avg. size = 45.43 nm
Figure S2

(a) Relative intensity (%) vs. size distribution (diameter, nm)
- Avg. size = 45.43 nm
- Avg. size = 118.7 nm

(b) Relative intensity (%) vs. size distribution (diameter, nm)
- Avg. size = 45.43 nm
- Avg. size = 54.24 nm

- Black: Bare gold nanoparticles
- Green: Antibody physical adsorption
- Red: Antibody chemical conjugation
$R^2_{SERS} = 0.9978$

$R^2_{ELISA} = 0.9966$
\[ y_{SERS} = y_0 + \frac{a}{1 + \left(\frac{x}{x_0}\right)^b} \]

\[ y_{ELISA} = y_0 + \frac{a}{1 + \left(\frac{x}{x_0}\right)^b} \]

\( y_0 = -0.3092 \)
\( x_0 = 1328.0042 \)
\( a = 206.4954 \)
\( b = -0.2415 \)

\( y_0 = 1.1066 \)
\( x_0 = 2535.7000 \)
\( a = 237.0813 \)
\( b = -0.3661 \)

(b)

< SERS-based assay, linear range >

- Linear range: 1000 ~ 0.1 ng/mL

- Linear curve equation:
\[ y = y_0 + ax \]

\[ y_0 = 33.1182 \]
\[ a = 20.4539 \]

- Linear curve equation \( R^2: 0.9794 \)

Figure S3
Figure S4
Figure S5
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<th>SEB concentration</th>
<th>SERS assay</th>
<th>ELISA</th>
<th>Optical density</th>
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<td>Average intensity</td>
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