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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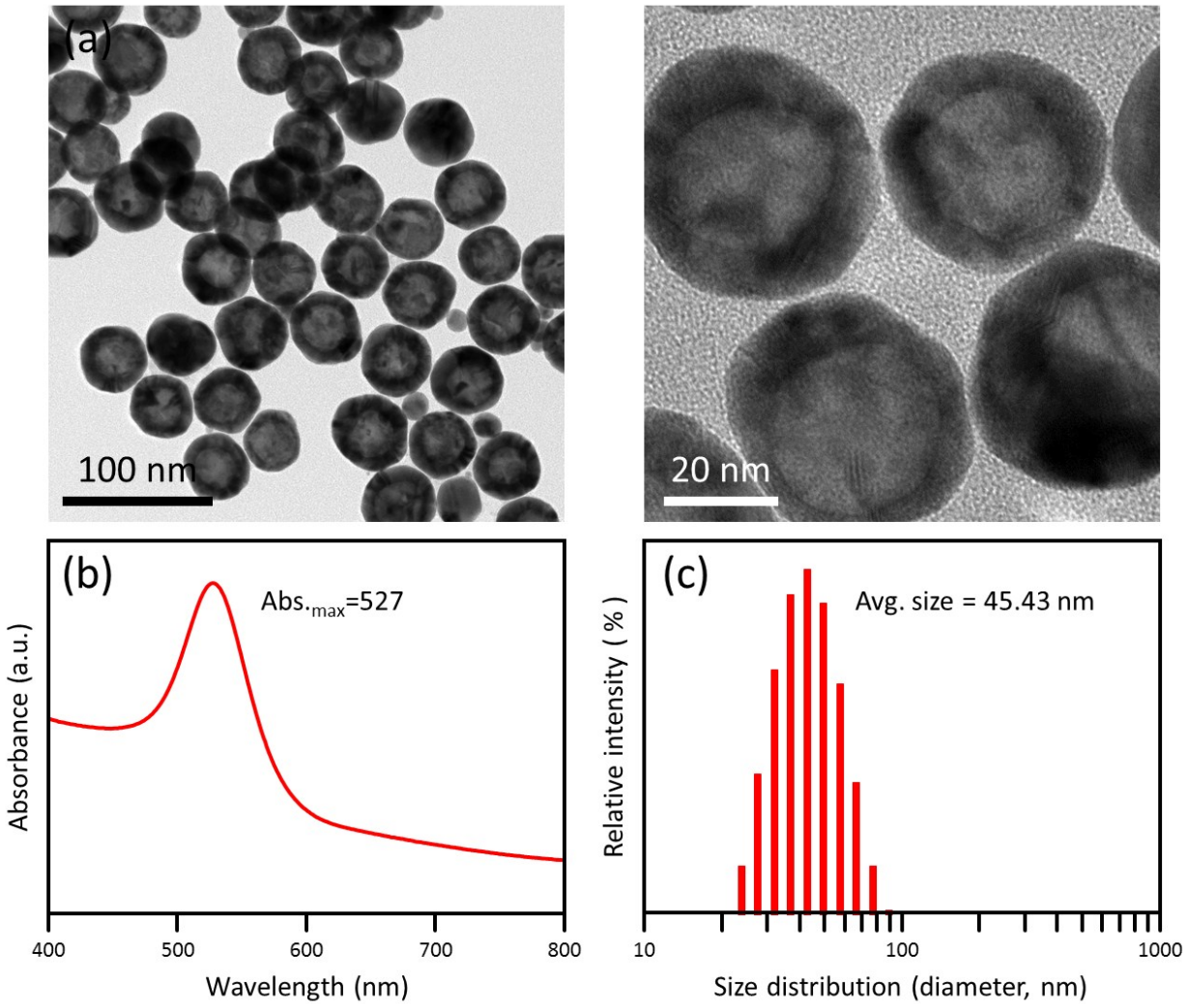

(a)
100 nm
20 nm
(b)
Abs.max=527
Absorbance (a.u.)
400
500
600
700
800
Wavelength (nm)
(c)
Avg. size = 45.43 nm
Relative intensity (%)
10
100
1000
Size distribution (diameter, nm)

Figure S1

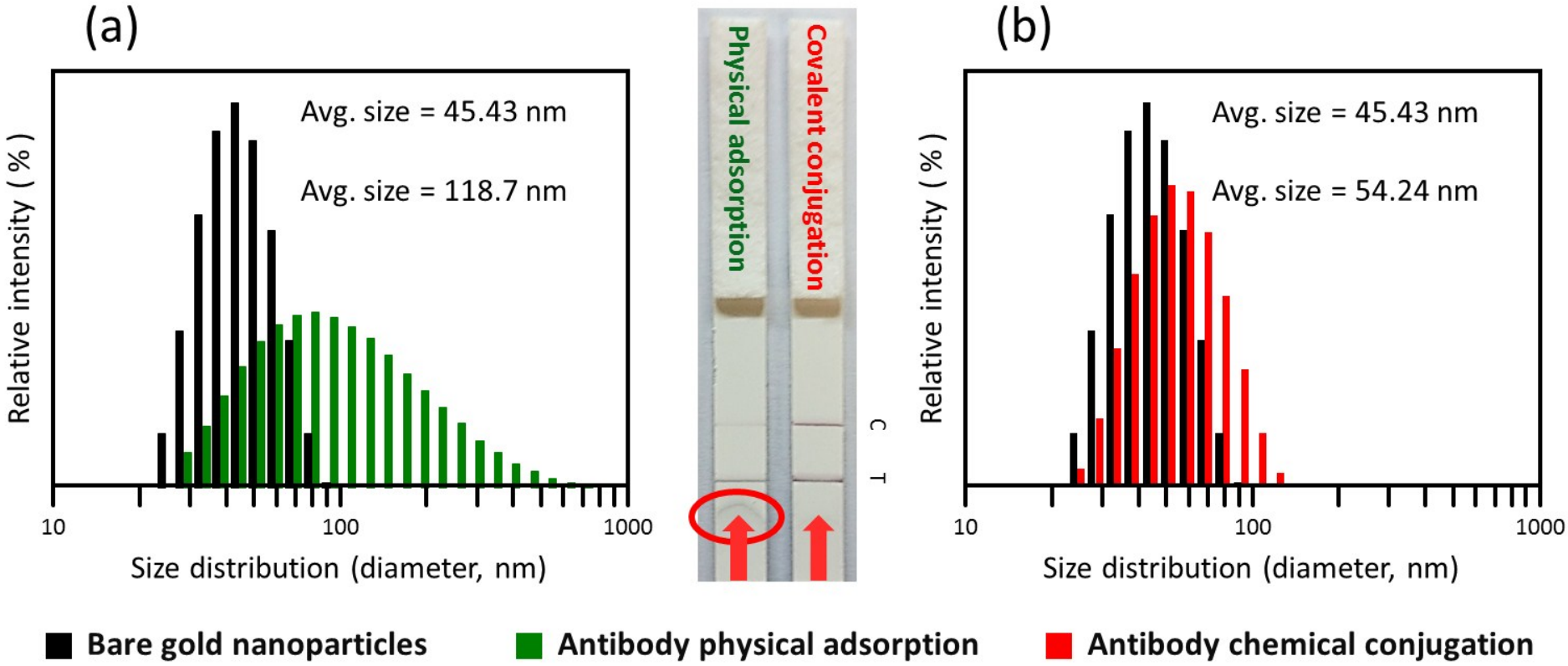
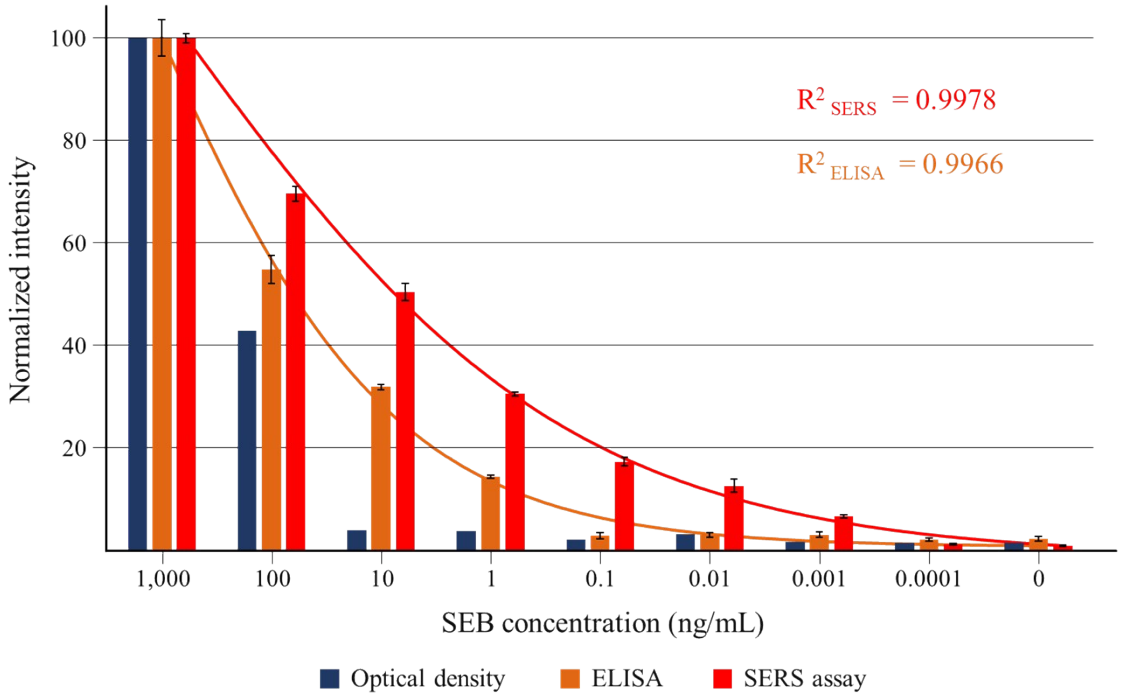

(a)
Avg. size = 45.43 nm
Avg. size = 118.7 nm
Relative intensity (%)
10
100
1000
Size distribution (diameter, nm)
Physical adsorption
Covalent conjugation
C
T
(b)
Avg. size = 45.43 nm
Avg. size = 54.24 nm
Relative intensity (%)
10
100
1000
Size distribution (diameter, nm)
Bare gold nanoparticles
Antibody physical adsorption
Antibody chemical conjugation

Figure S2

(a)


100
80
60
40
20
Normalized intensity
R^2_{SERS} = 0.9978
R^2_{ELISA} = 0.9966
1,000
100
10
1
0.1
0.01
0.001
0.0001
0
SEB concentration (ng/mL)
Optical density
ELISA
SERS assay

$$y_{SERS} = y_0 + \frac{a}{1 + (\frac{x}{x_0})^b}$$

$y_0 = -0.3092$

$x_0 = 1328.0042$

$a = 206.4954$

$b = -0.2415$

$$y_{ELISA} = y_0 + \frac{a}{1 + (\frac{x}{x_0})^b}$$

$y_0 = 1.1066$

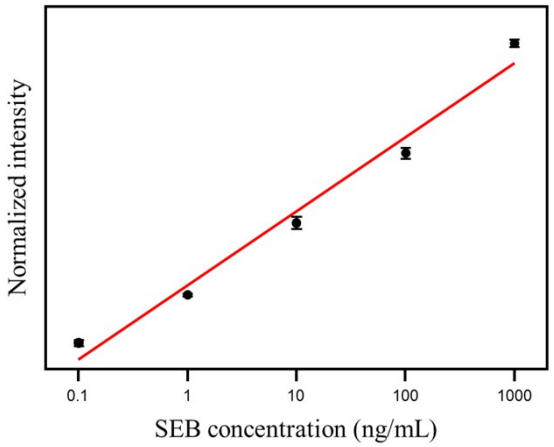
$x_0 = 2535.7000$

$a = 237.0813$

$b = -0.3661$

(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

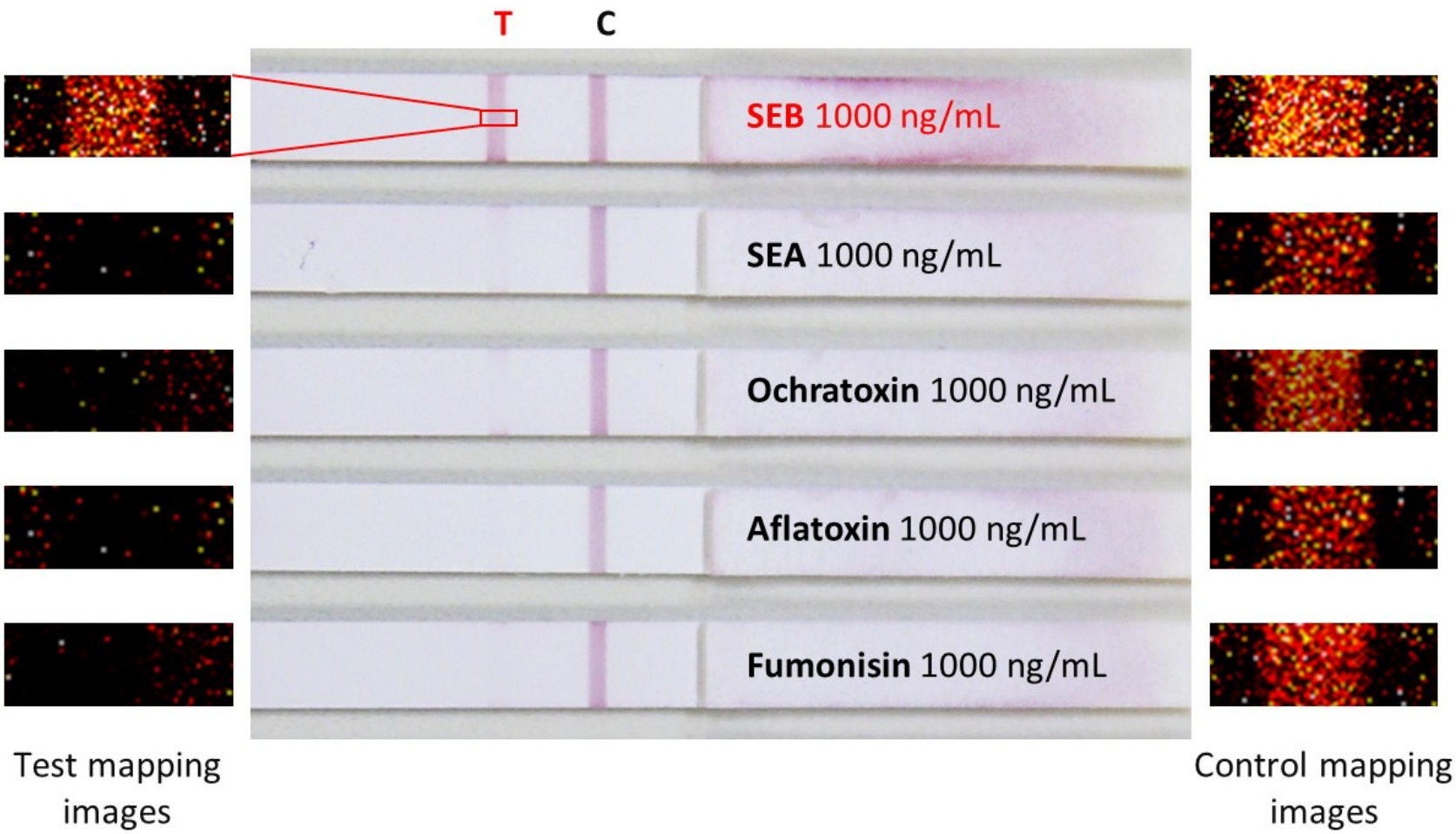

T
C
SEB 1000 ng/mL
SEA 1000 ng/mL
Ochratoxin 1000 ng/mL
Aflatoxin 1000 ng/mL
Fumonisin 1000 ng/mL
Test mapping images
Control mapping images

Figure S4

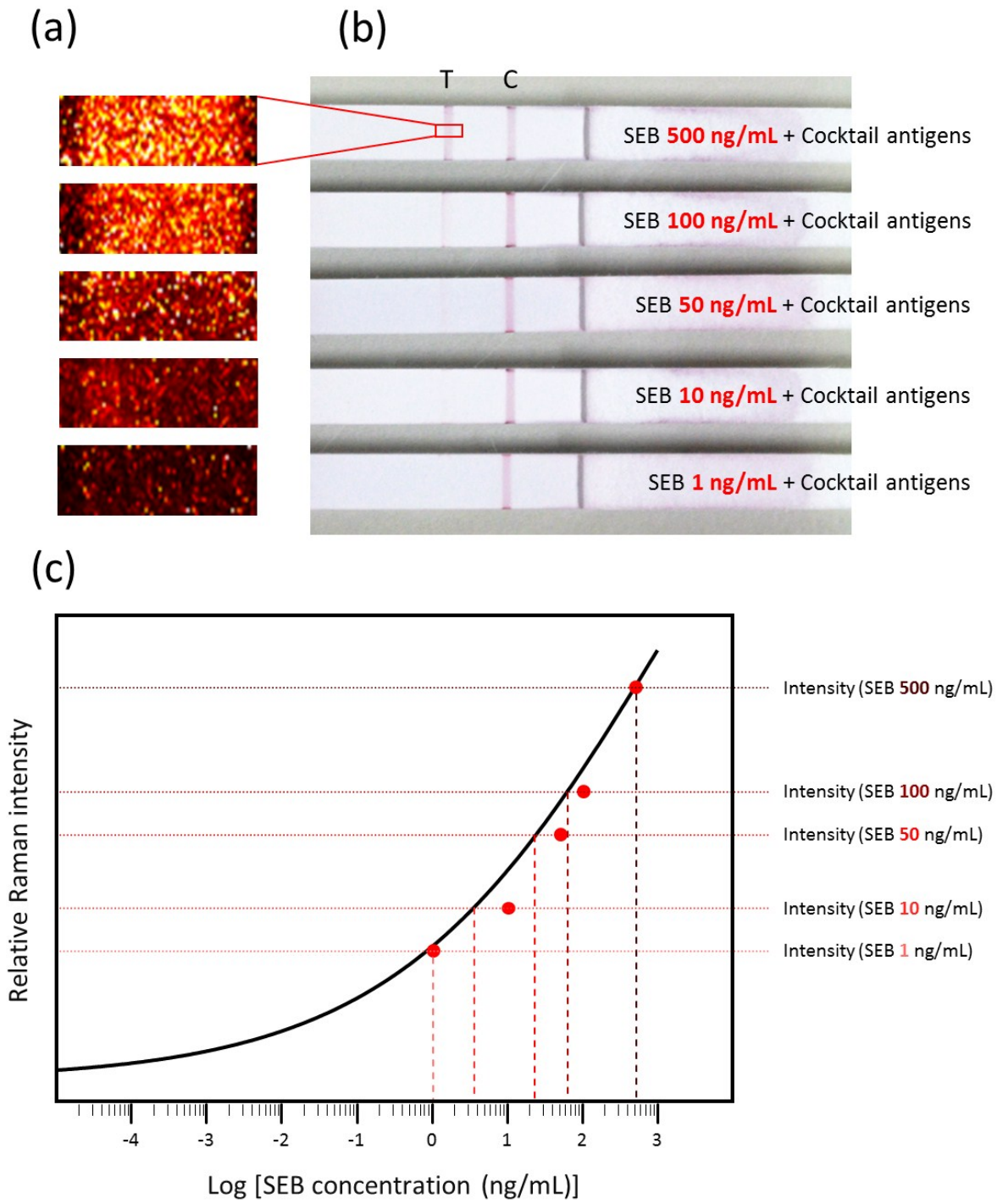

(a)
(b)
T
C
SEB 500 ng/mL + Cocktail antigens
SEB 100 ng/mL + Cocktail antigens
SEB 50 ng/mL + Cocktail antigens
SEB 10 ng/mL + Cocktail antigens
SEB 1 ng/mL + Cocktail antigens
(c)
Relative Raman intensity
Intensity (SEB 500 ng/mL)
Intensity (SEB 100 ng/mL)
Intensity (SEB 50 ng/mL)
Intensity (SEB 10 ng/mL)
Intensity (SEB 1 ng/mL)
-4
-3
-2
-1
0
1
2
3
Log [SEB concentration (ng/mL)]

Figure S5

Table S1 Normalized y intensity values for SERS-based assay, ELISA and optical density measurements

SEB(concnetration)	SERS assay				ELISA				Optical density	
	Average intensity	Standard deviation	Normalized intensity	Standard deviation	Average intensity	Standard deviation	Normalized intensity	Standard deviation	Optical intensity	Normalized intensity
1,000 ng/ml	9291.72667	88.81138	**100.00000**	**0.95581**	2.15213	**0.07695**	**100.00000**	3.57574	415.00000	**100.00000**
100 ng/ml	6469.38667	133.89288	**69.62524**	**1.44099**	1.18038	**0.05811**	**54.84695**	2.70007	177.62500	**42.80120**
10 ng/ml	4687.02333	156.76420	**50.44297**	**1.68714**	0.68413	**0.01078**	**31.78835**	0.50092	15.99990	**3.85540**
1 ng/ml	2833.98000	34.29148	**30.50004**	**0.36905**	0.30675	**0.00654**	**14.25335**	0.30372	15.62500	**3.76506**
0.1 ng/ml	1606.79000	76.46555	**17.29270**	**0.82294**	0.06116	**0.01313**	**2.84184**	0.61010	8.68800	**2.09349**
0.01 ng/ml	1170.00278	123.75443	**12.59188**	**1.33188**	0.06313	**0.00882**	**2.93315**	0.40976	12.93800	**3.11759**
0.001 ng/ml	613.83067	25.47608	**6.60621**	**0.27418**	0.06525	**0.01025**	**3.03189**	0.47609	6.68800	**1.61157**
0.0001ng/ml	107.71638	9.45085	**1.15927**	**0.10171**	0.04575	**0.00565**	**2.12581**	0.26243	6.00000	**1.44578**
0.0 ng/ml	84.34740	11.06853	**0.90777**	**0.11912**	0.04825	**0.00924**	**2.24197**	0.42948	6.43800	**1.55133**