

Supporting Information

Sensitive Detection of SARS-CoV-2 Using SERS-based Aptasensor

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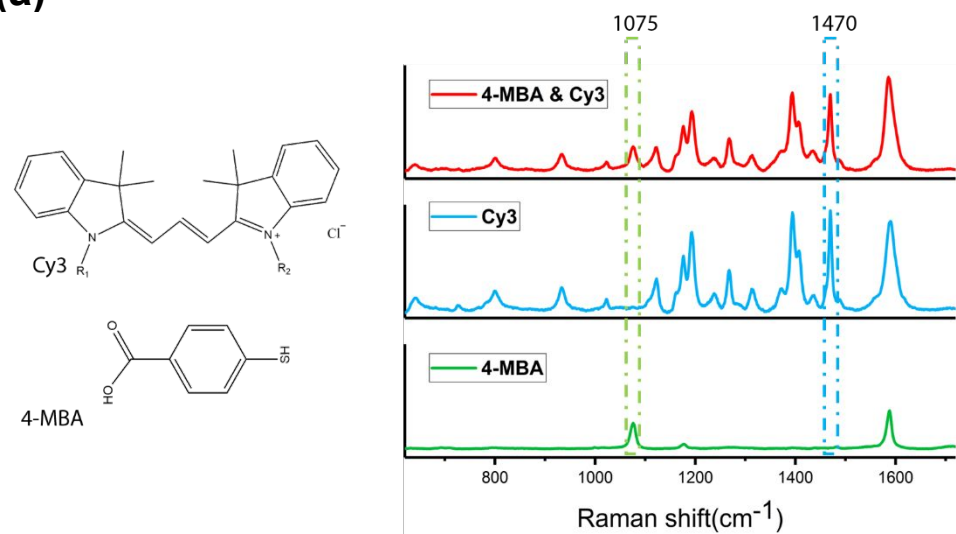
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(a)



(b)

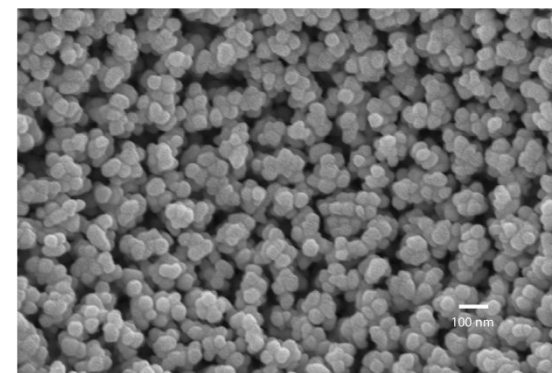


Figure S1. (a) Average SERS spectra of 0.1 mM 4-MBA, 10 μ M Cy3, and their 1:1 molar mixtures for 36 spots on nanopopcorn substrate. (b) SEM image of nanopopcorn substrate.

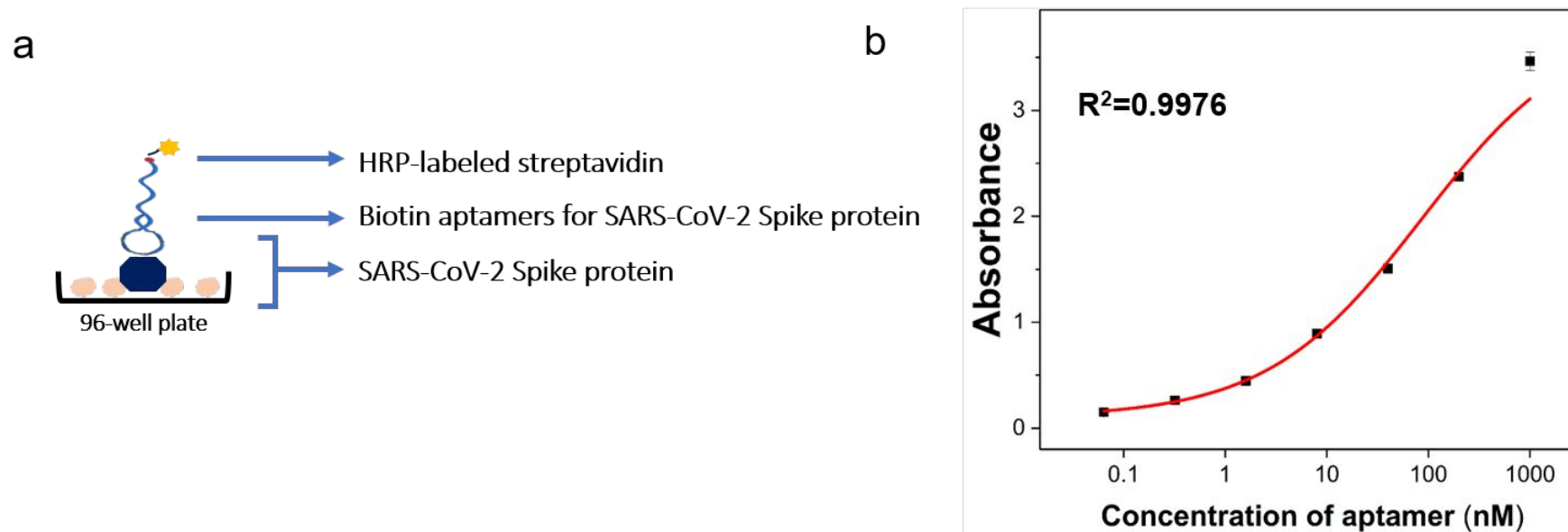


Figure S2. (a) A schematic illustration of the assay between the SARS-CoV-2 spike protein and DNA aptamer. (b) Corresponding calibration curve of DNA aptamer in the 0 ~ 1.0 μ M range. Error bars indicate the standard deviations from the three measurements.

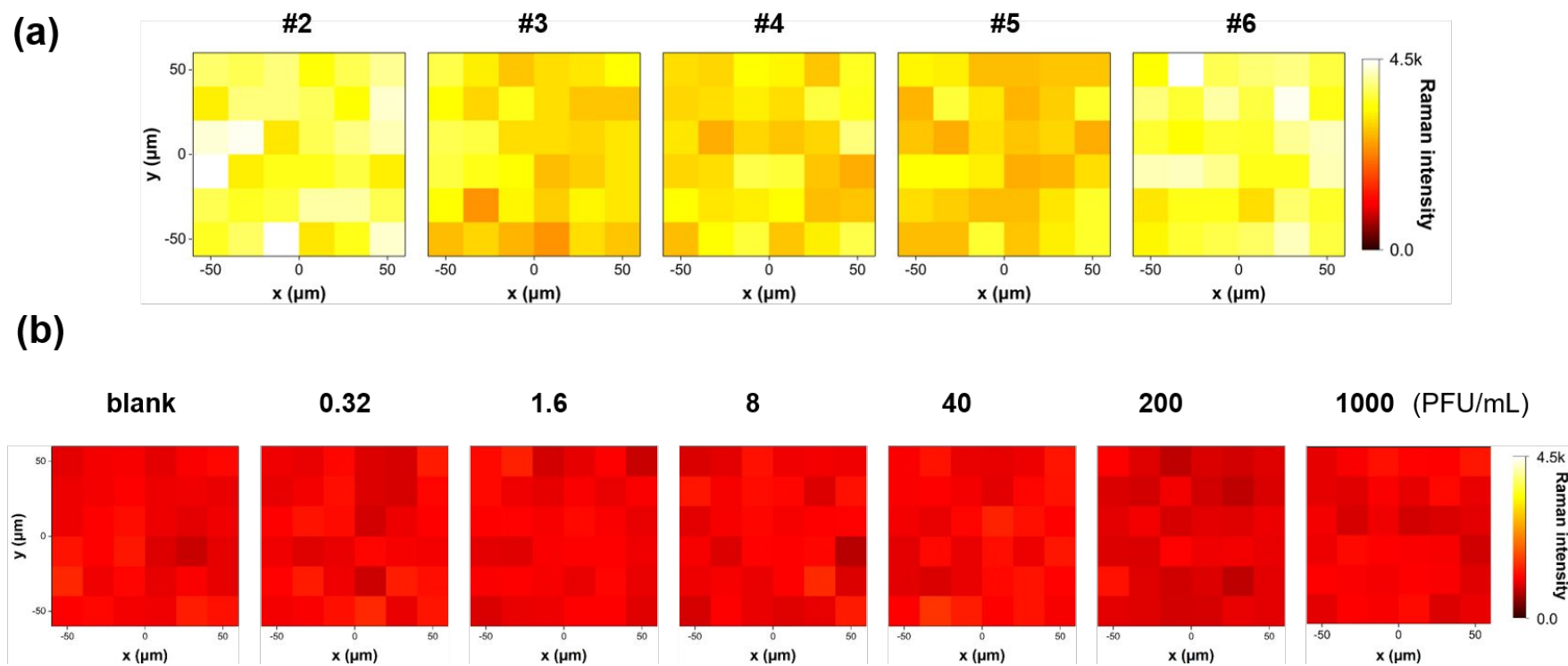


Figure S3. (a) Raman images measured with the Cy3 Raman peak intensity at 1470 cm^{-1} on other Au nanopopcorn substrates from #2 to #6. (b) Raman mapping images measured at 1075 cm^{-1} , for various SARS-CoV-2 lysate concentrations ranging from 0 to 1000 PFU/mL.

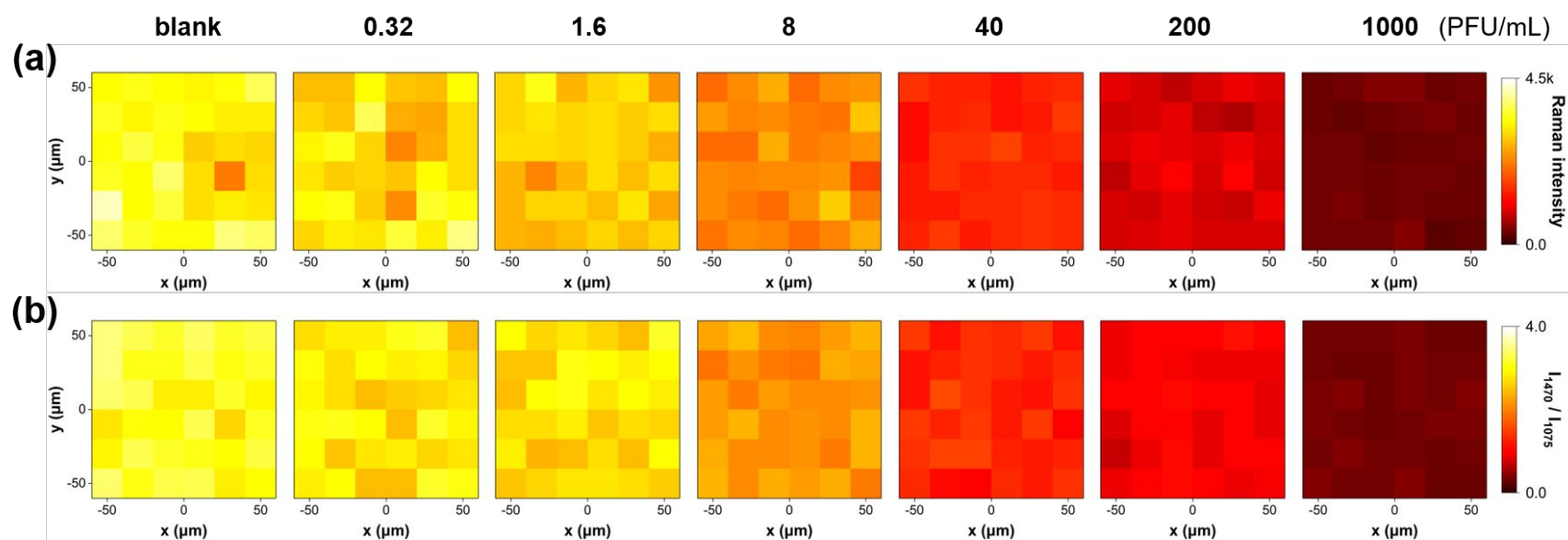
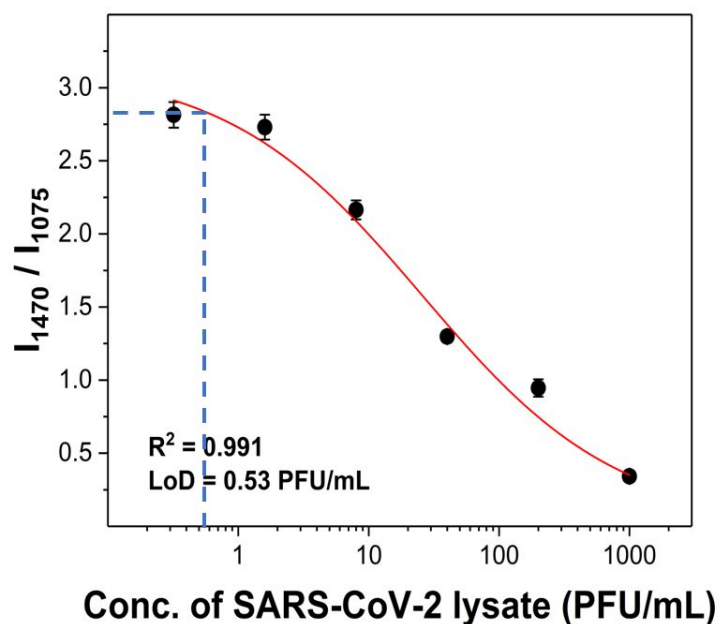


Figure S4. (a) Raman images measured at 1470 cm^{-1} for various SARS-CoV-2 lysate concentrations ranging from 0 to 1000 PFU/mL in PBS buffer. The scale bar on the right shows the color coding used to depict Raman peak intensity. (b) Normalized Raman mapping

images using Raman peak intensity ratios of (I_{1470} / I_{1075}) for various SARS-CoV-2 lysate concentrations ranging from 0 to 1000 PFU/mL in PBS buffer. The scale bar on the right shows the color coding used to depict normalized Raman peak intensity ratios.



Regression Parameter

$$y = y_0 + \frac{a}{1 + \left(\frac{x}{x_0}\right)^b}$$

a : 3.4034	x_0 : 32.9052
b : 0.476	y_0 : -0.2103

- (1) Limit of blank (LOB) = $\text{mean}_{\text{blank}} - 1.645 * (\text{SD}_{\text{blank}})$
- (2) Limit of detection (LOD) = $\text{LOB} - 1.645 * (\text{SD}_{\text{low concentration sample}})$

Figure S5. Four-parameter equation to determine the LoD of SARS-CoV-2 lysate.

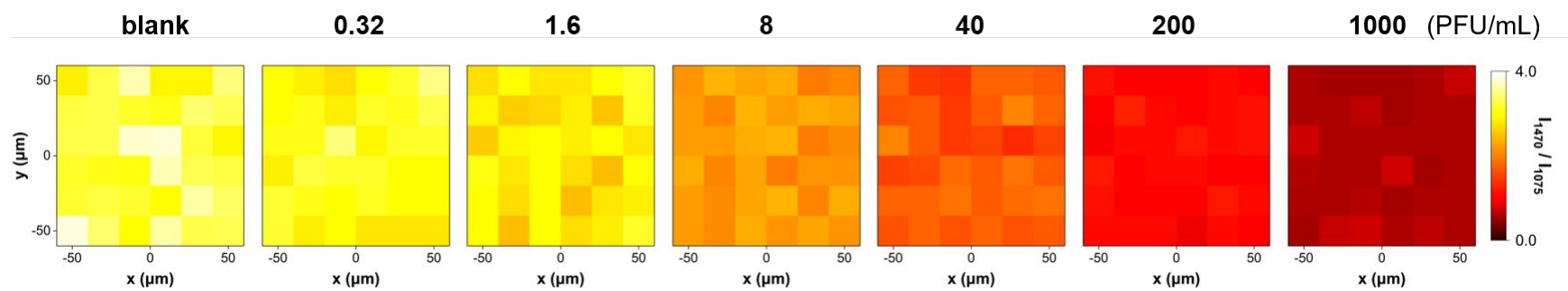


Figure S6. Normalized Raman mapping images using Raman peak intensity ratios of (I_{1470}/I_{1075}) for various SARS-CoV-2 lysate concentrations ranging from 0 to 1000 PFU/mL in clinical negative respiratory specimens. The scale bar on the right shows the color coding used to depict normalized Raman peak intensity ratios.

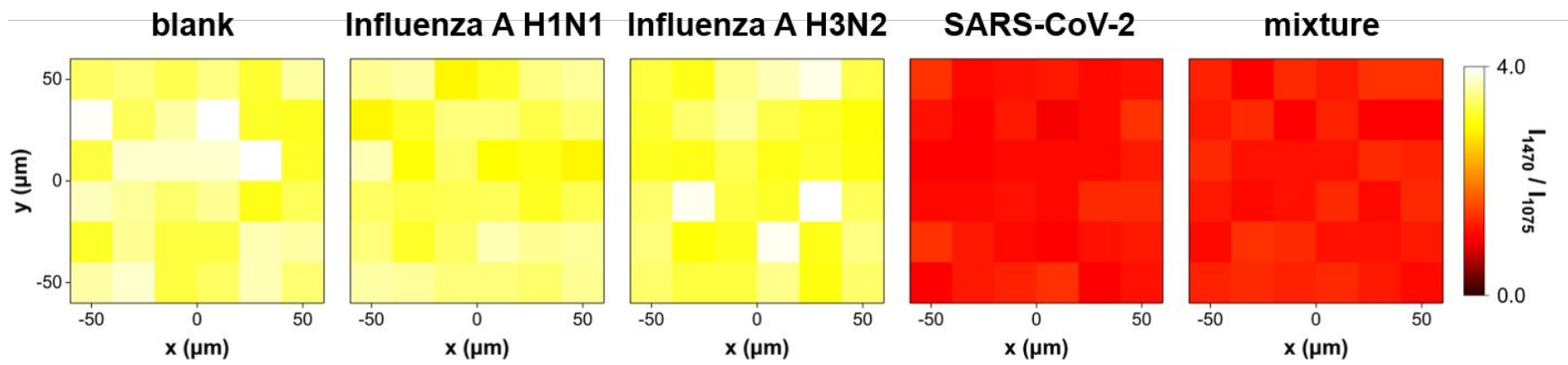


Figure S7. Normalized Raman images using Raman peak intensity ratios of (I_{1470}/I_{1075}) for the blank, influenza A/H1N1 (4500 PFU/mL), influenza A/H3N2 (15000 PFU/mL), SARS-Cov-2 (200 PFU/mL), and their mixtures for the selectivity test. Each target was spiked into clinical negative respiratory specimens. The scale bar on the right shows the color coding used to depict normalized Raman peak intensity ratios.