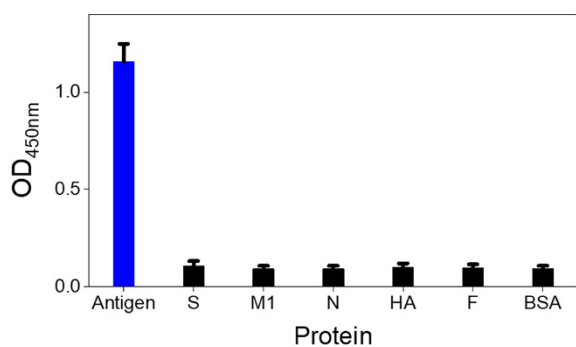
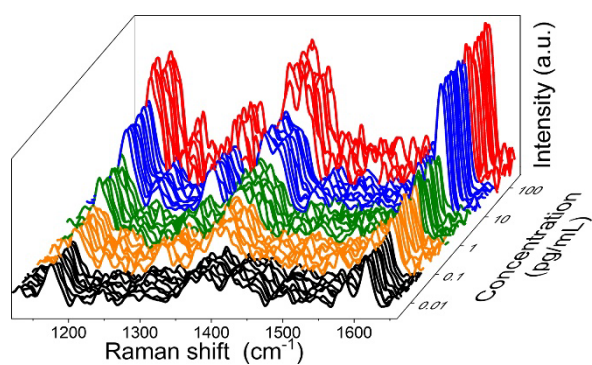


## Supplementary Material

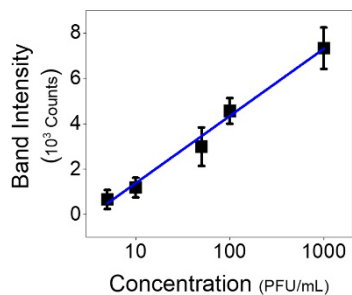
### Supplemental Figures



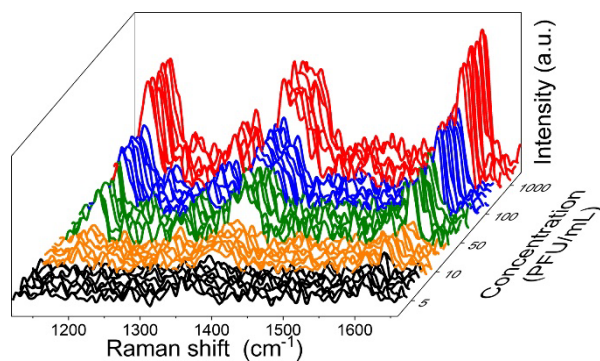
**Figure S1.** Results of sandwich ELISA for SARS-CoV-2 antigen, SARS-CoV-2 S-protein, influenza M1, N, HA proteins, RSV F-protein, and BSA, using detection and reporter antibodies. Data represent the average  $\pm$  standard deviation of 3 measurements.



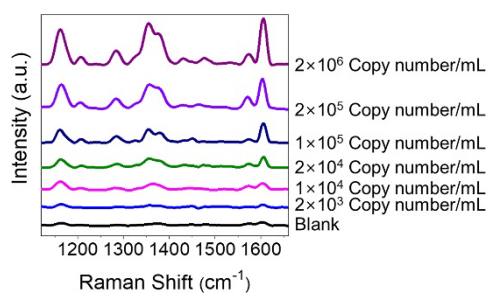
**Figure S2.** Full SERS data of Figure 4d.



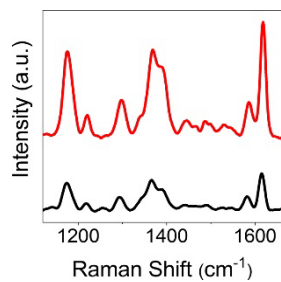
**Figure S3.** A plot of  $1170\text{ cm}^{-1}$  band intensity as a function of SARS-CoV-2 concentration. The blue line is linearly fitted. Data represent the average  $\pm$  standard deviation from 10 measurements.



**Figure S4.** Full SERS data of Figure S3.



**Figure S5.** SERS spectra of MGITC measured from hollow Au NP-assembled magnetic beads after detection of SARS-CoV-2 (0 to  $2 \times 10^6$  Copy number/mL) in human nasopharyngeal aspirate samples.



**Figure S6.** SERS spectra of MGITC measured from the hollow Au NP-assembled magnetic beads (red) and Au NP-assembled magnetic beads (black) after the detection of the SARS-CoV-2 antigen (1 ng/mL).

## Supplemental Tables

**Table S1.** RT-qPCR results of the clinical samples

Clinical sample	RT-qPCR ( $C_t$ value)	
	RdRp	Envelope
1	32.69	32.08
2	33.85	33.02
3	26.14	25.75
4	22.86	21.37
5	34.28	33.57
6	34.85	34.67
7	32.35	31.55
8	31.73	32.47
9	30.74	30.18
10	31.37	31.38
11	31.02	30.55
12	31.79	31.75
13	35.54	34.55
14	28.21	27.92
15	32.39	31.08
16	Not detected	Not detected
17	Not detected	Not detected
18	Not detected	Not detected
19	Not detected	Not detected

**Table S2.** LODs of the commercially available SARS-CoV-2 antigen diagnostic kits (Corman et al., 2021)

<b>Name</b>	<b>LOD (PFU/mL)</b>
Abbot	88
RapiGEN	880
Healgen	88
Coris BioConcept	880
R-Biopharm	88
Nal von miden	88
Roche-SD Biosensor	88
Innova	100

**Table S3.** LODs of the SARS-CoV-2 antigen detection methods

<b>Method</b>	<b>LOD</b>	<b>Time</b>	<b>Reference</b>
Field effector transistor	16 PFU/mL	1 h	Seo et al., 2020
SERS	18 virus particles/mL	5 min	Pramanik et al., 2021
Electrochemical	$5.5 \times 10^5$ PFU/mL	45 min	Mojsoska et al., 2021
Nanoplasmonics	370 virus particles/mL	15 min	Huang et al., 2021
Strip	$1 \times 10^3$ TCID <sub>50</sub> /mL	15 min	Zhang et al., 2020
ELISA	$8 \times 10^3$ PFU/mL	80 min	Barlev-Gross et al., 2021

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