Supporting Information

Klarite as Label-Free SERS-Based Assay: A Promising Approach for Atmospheric Bioaerosol Detection

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Experimental

Reagents and Materials.

All the chemicals were purchased either from Sigma Aldrich or mentioned otherwise. *Escherichia coli* (DH5 alpha) was purchased from Tiangen Biotech co. Ltd, Beijing China. HyClone phosphate buffered saline (PBS) solution was purchased from GE Healthcare Life Sciences. Klarite™ was purchased from Reinshaw Diagnostics Ltd, Glasgow, U.K. All the solutions were prepared with Milli-Q water.

Microorganisms Preparation.

Shock-frozen *E.coli* (DH5 alpha) cells were separately cultivated in sterile LB medium at 200 rpm and 37 °C for 14 h. 40 mL of each of the bacterial solutions were harvested and then centrifuged at 3750 rpm for 10 min at 4 °C (Beckman Coulter Allegra X-12, Beckman Coulter, Inc., American). Afterwards, the supernatants were discarded, and pellets were washed twice with 20 mL PBS by centrifugation at 3750 rpm for 10 min at 4 °C. Finally, the resulting pellets were resuspended in PBS after vigorous shaking.

Characterization and Instruments.

SEM images were taken with an accelerating voltage of 3000 V with TM-1000 (Hitachi). SERS measurements were performed with XploRA PLUS confocal spectrometer (HORIBA Scientific, France).

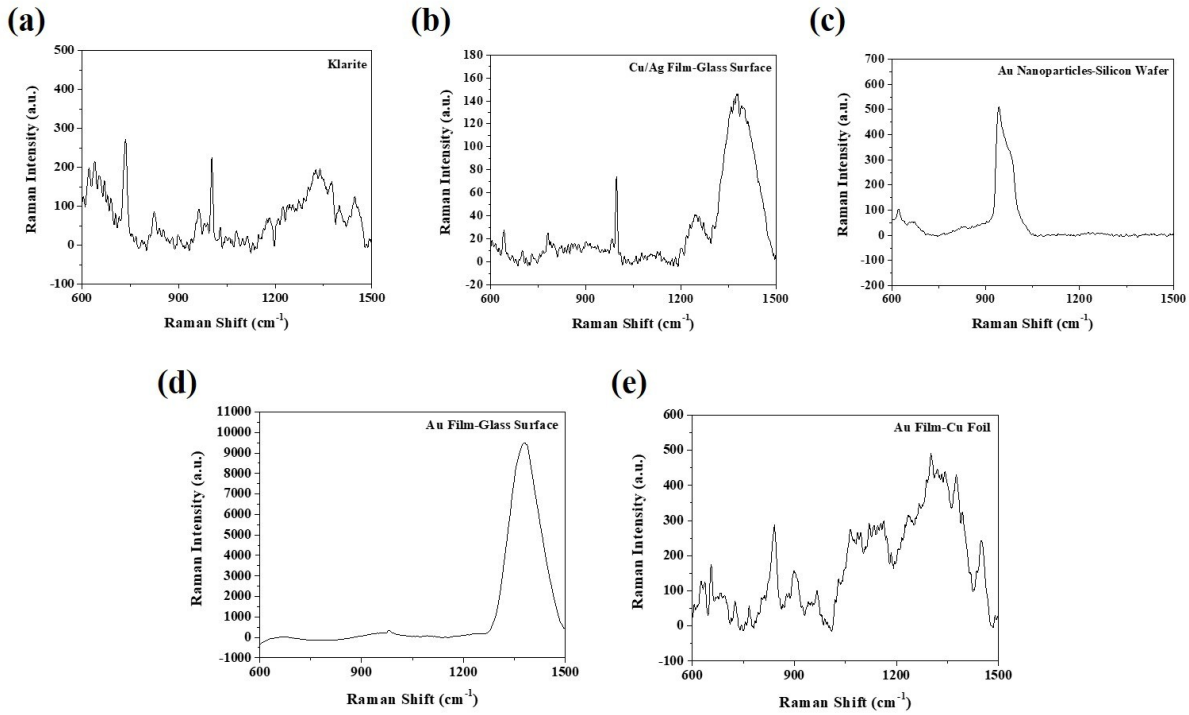

Fig. S1. SERS spectra of *E.coli* on (a) Klarite, (b) Cu/Ag film-glass surface, (c) Au nanoparticles-silicon wafer, (d) Au film-glass surface and (e) Au film-Cu foil. The concentration of *E.coli* used was 1.8 x 10^9 cells mL^{-1}.

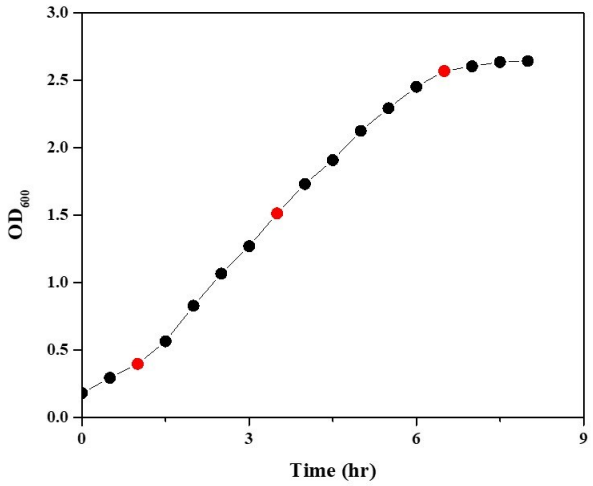

Fig. S2. Different growth rate was observed when *E.coli* grown to OD_{600} 0.4, 1.5 and 2.5 and then harvested.

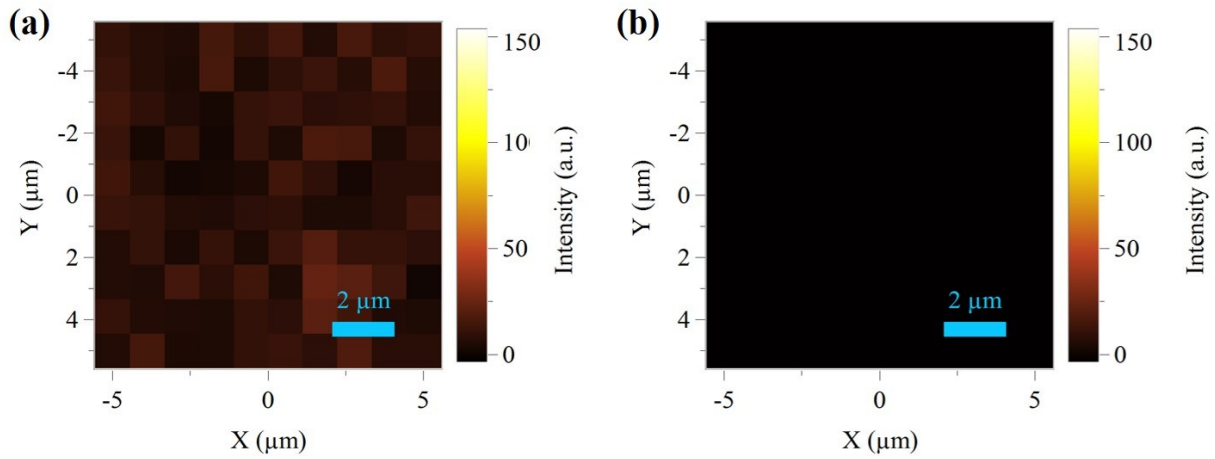

Fig. S3. SERS mapping of ambient bioaerosol samples. SERS mapping of (a) positive sample collected from real environment and (b) negative sample collected from air flow chamber exposed under UV light. SERS mapping performed at 735 cm^{-1}. 50x objective lens was used.

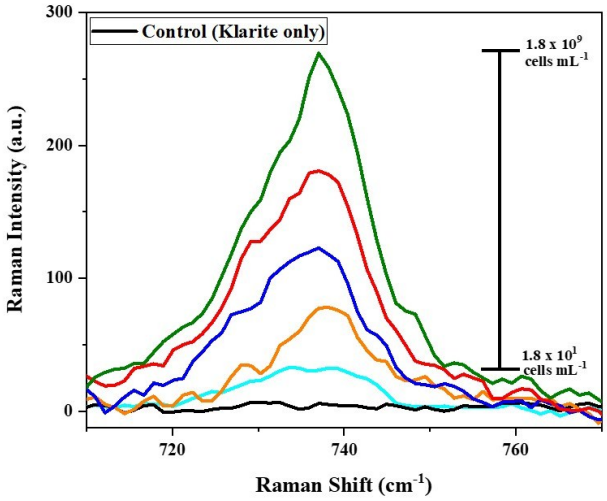

Fig. S4. SERS spectra of different concentrations of *E.coli* from 1.8 x 10^9 to 1.8 x 10^1 cells mL^{-1}.

Table S1. Peaks assignment of the SERS spectra of the *E.coli*.[1-7]

Raman Shift (cm^{-1})	Assignment
625	phe skeletal
652	δ(COO-)
735	adenine, glycosidic ring mode
805	υ(CN)
828	ring breathing Tyr
852	ring breathing Tyr
955	υ(CN)
1002	phenylalanine
1030	phenylalanine C-H in plane
1128	amide III, adenine, polyadenine and DNA
1158	proteins
1210-1310	amide III
1227	amide III, polyadenine and DNA
1330	$\upsilon(NH_2)$ adenine, polyadenine, DNA
1320-1340	DNA/RNA, Proteins
1360-1440	υ(COO-) symmetric
1376	υ_s(COO-)
1440-1460	$\delta(CH_2)$ saturated lipids, proteins

δ: Bend
υ: Stretch
Tyr: Tyrosine
Phe: Phenylalanine
υ_s: Symmetric Stretch

References

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