

Supporting Information

Rapid Raman Activated Cell Ejection for Isolation of Single Cells

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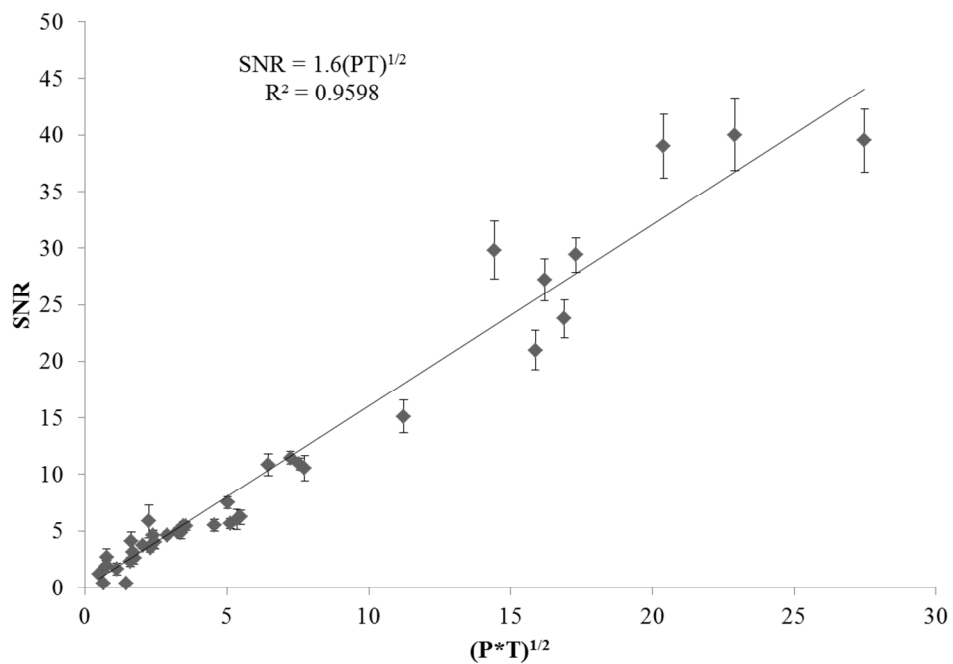


Figure S-1 A linear relationship between SNR of single bacterial Raman spectra and laser power-time ($\sqrt{P \times T}$). Points are the averages of 20 measurements with standard deviation error bars.

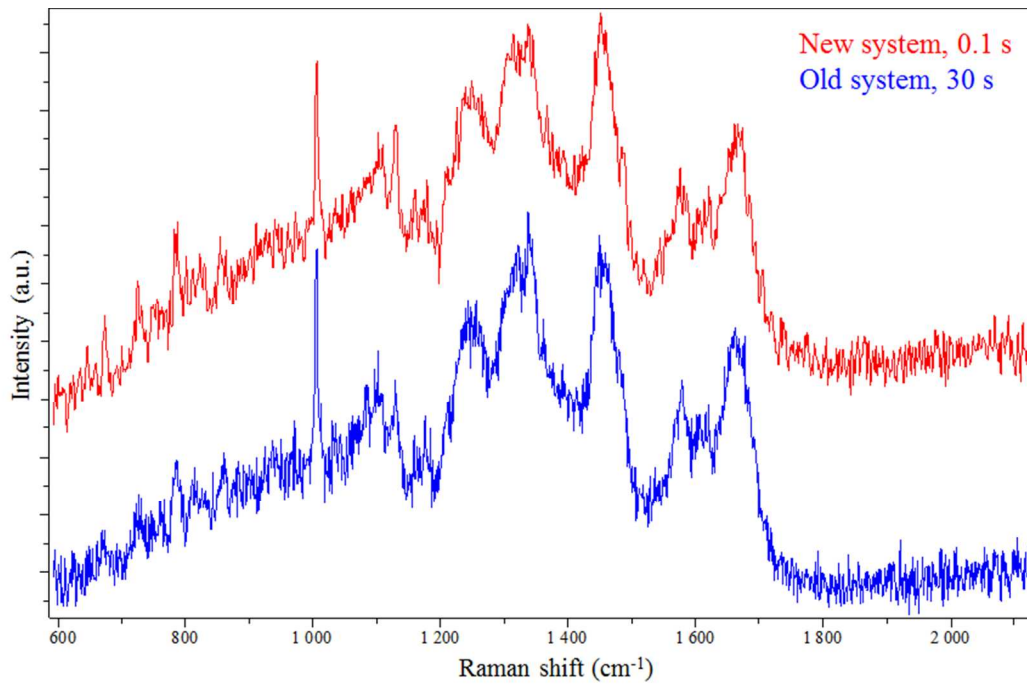


Figure S-2 New system with higher laser power significantly reduced single cell Raman acquisition time.

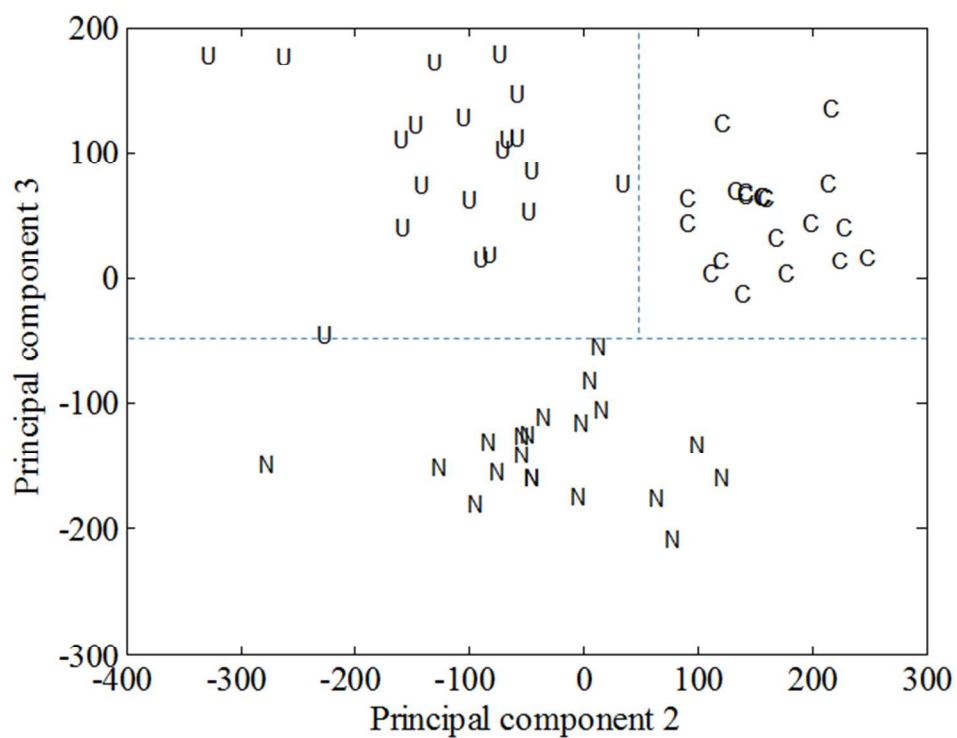


Figure S-3 PCA scores plot of Raman spectra of *E. coli* DH5 α with ^{13}C or ^{15}N incorporation. C, cells with ^{13}C substitution; N, cells with ^{15}N substitution; and U, unlabeled cells.

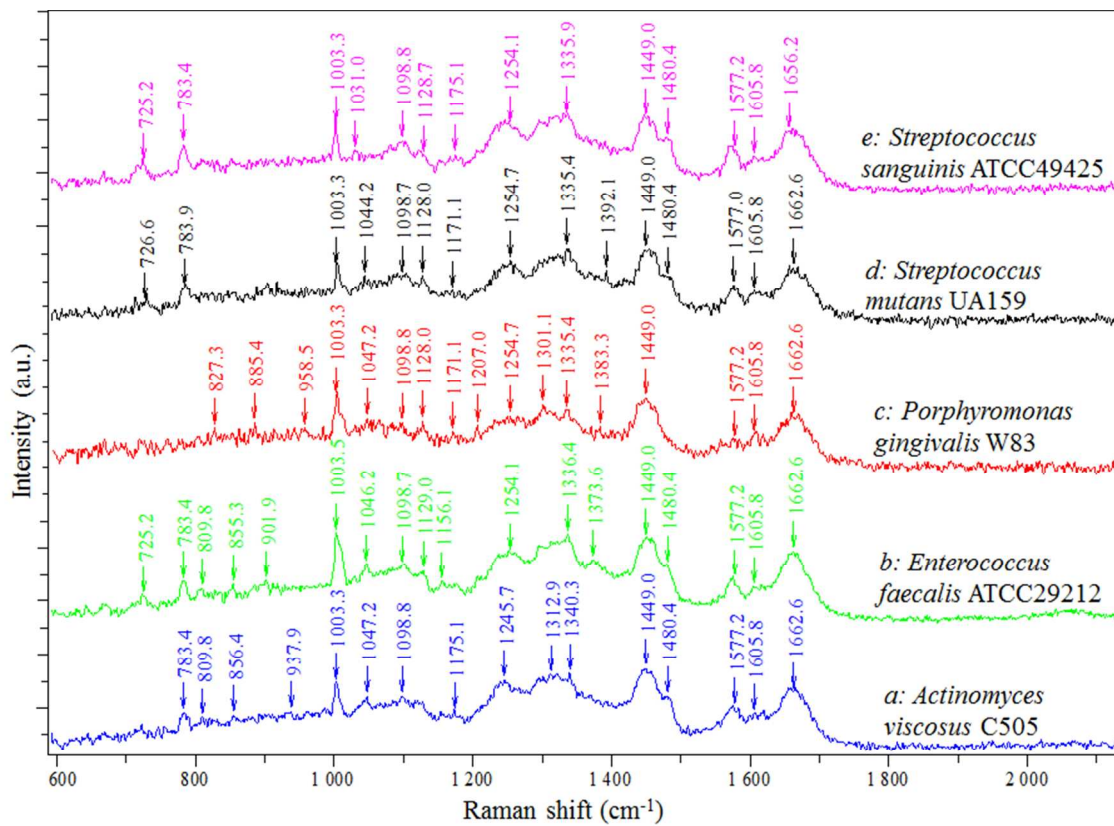


Figure S-4 Single cell Raman spectra of five oral bacterial species (60 mW, 0.5 s exposure time).

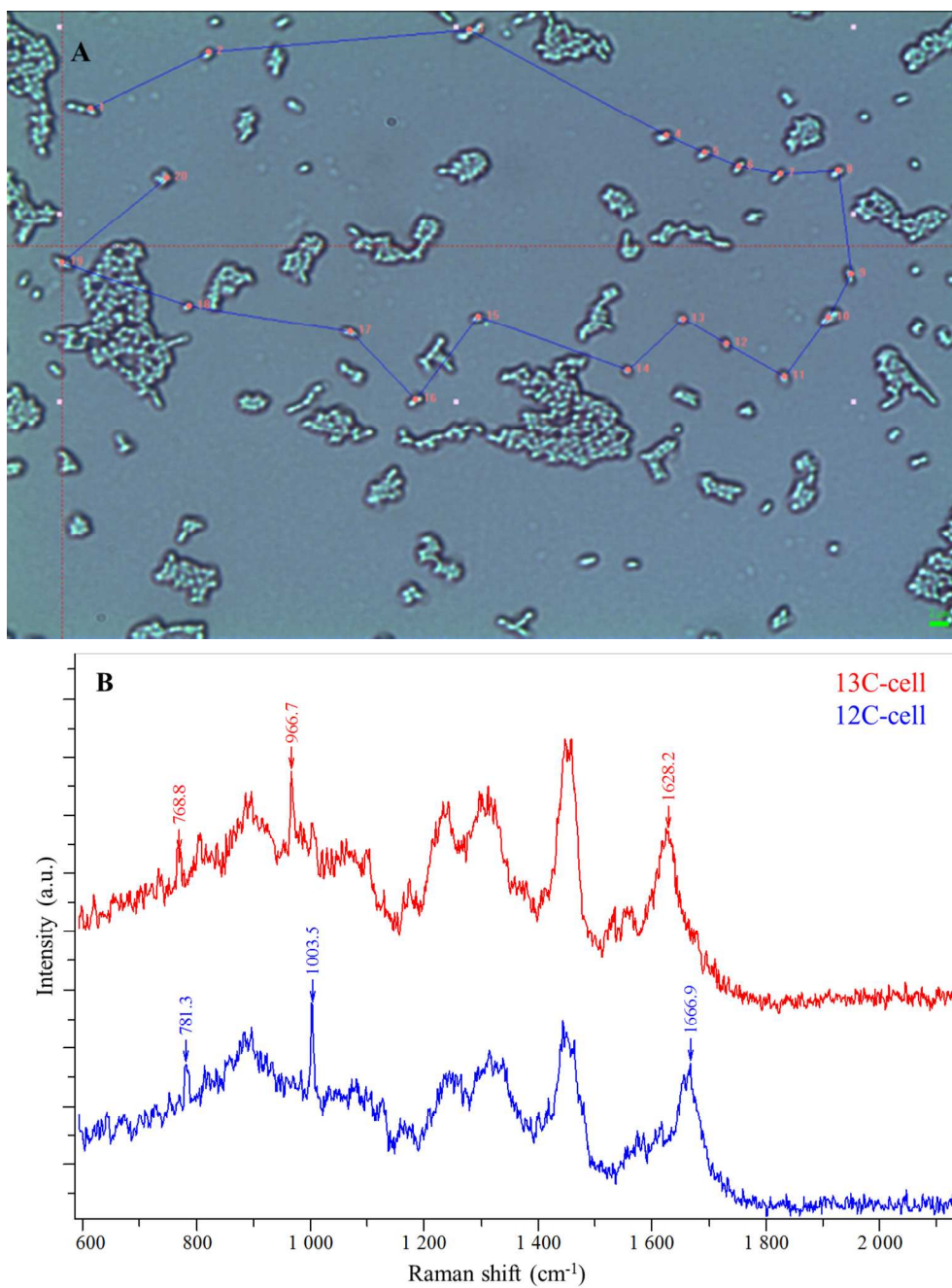


Figure S-5 (A) Twenty cells were randomly chosen for SCRS measurement, each took a 0.5 s acquisition time; the total time for scanning of 20 cells was ~12 s. **(B)** SCRS of ¹²C and ¹³C cells enabled a clear differentiation of stable isotope labeled cells.

Table S-1 Bacterial strains used in this study

Strain ID	Name	Gram stain	Culture	Shape	Habitat	Pathogenicity
	<i>Escherichia coli</i> DH5 α	-	Aerobic	Rod		Non-pathogenic
a	<i>Actinomyces viscosus</i> C505 ¹	+	Facultatively anaerobic	Filamentous	Oral cavity	Canine infection
b	<i>Enterococcus faecalis</i> ATCC29212 ²	+	Facultatively anaerobic	Coccus	Oral cavity	Multidrug-resistant pathogen
c	<i>Porphyromonas gingivalis</i> W83 ³	-	Anaerobic	Rod	Oral cavity	Periodontal disease
d	<i>Streptococcus mutans</i> UA159 ⁴	+	Facultatively anaerobic	Coccus	Oral cavity	Dental caries
e	<i>Streptococcus sanguinis</i> ATCC49425 ⁵	+	Facultatively anaerobic	Coccus	Oral cavity	Non-pathogenic

-: Gram's negative

+: Gram's positive

Table S-2 Laser power identification for the 532 nm laser through the $\times 100$ objective

Laser source power (mW)	100	200	300	400	500
Laser power on the sample (mW)	25	42	52	57	60

Table S-3 Major Raman spectra bands shifted due to ¹³C substitution

Raman bands of ¹² C-cells (cm ⁻¹)	The extent of Raman shift of ¹³ C-cells (cm ⁻¹)	Assignment
787.2	-16.6	Cytosine, uracil ⁶
1003.3	-36.6	Phenylalanine ⁶
1247.7	-13.5	Amide III ⁷
1342.7	-15.3	Adenine ⁸
1577.7	-46.9	Guanine, adenine ⁶
1662.6	-34.6	Unsaturated lipid, amide I ⁹

Table S-4 Major Raman spectra bands shifted due to ¹⁵N substitution

Raman bands of ¹⁴ N-cells (cm ⁻¹)	The extent of Raman shift of ¹⁵ N-cells (cm ⁻¹)	Assignment
787.2	-3.4	Cytosine, uracil ⁶
1174.1	-10.2	Tyrosine, phenylalanine ⁸
1247.7	-13.5	Amide III ⁷
1342.7	-19.1	Adenine ⁸
1480.8	-10.4	Guanine, adenine ⁶
1577.7	-7.3	Nucleic acids ⁸

Table S-5 Major Raman spectra bands responsible for the classification of five oral bacteria

Raman bands (cm ⁻¹) CV1	Assignment
725-729 (725.2)	Adenine
753-798 (783.4)	Cytosine, uracil, (ring, str)
1326-1367 (1355.4)	Adenine, guanine, tyrosine, tryptophan
1459-1490 (1480.4)	Nucleic acids

Raman bands (cm ⁻¹) CV2	Assignment
1003-1010 (1003.4)	Phenylalanine
760-784 (783.4)	Cytosine, uracil, (ring, str)
842-856 (855.3)	Buried tyrosine
1245-1254 (1254.7)	Adenine, amide III

Reference:

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