

Electronic supplementary information

Axially perpendicular offset scheme for obtaining Raman spectra of
housed samples in glass bottles with minimized glass-peak
background

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1. Determination of focal length of each glass bottle

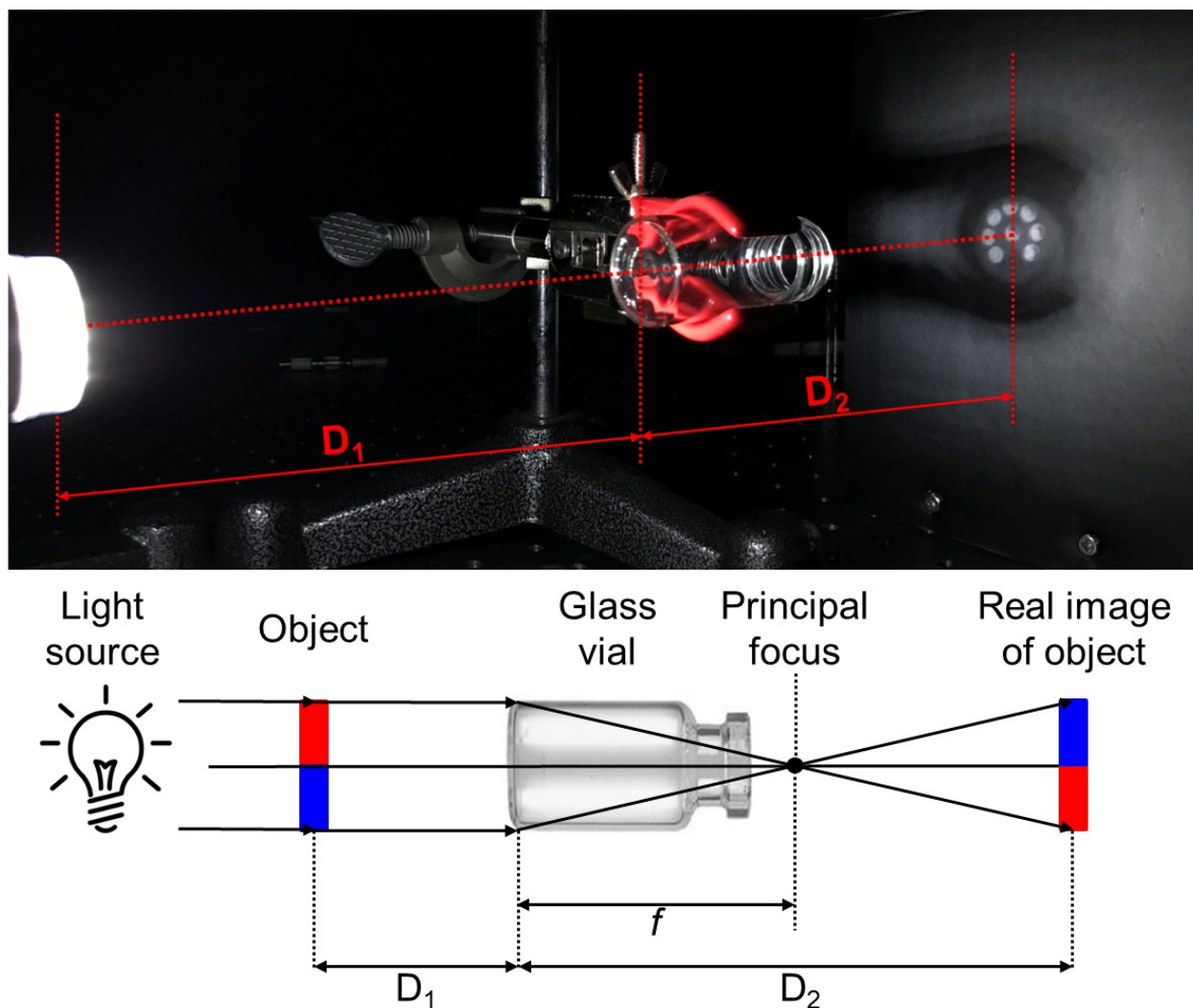


Figure S1. Picture of image focusing through the bottom of the glass bottle (top) and diagram explaining the determination of focal length (bottom).

Table S1. Determined focal length of glass bottles

| | D_1 | D_2 | f | Unit (cm) |
|-----------|-------|-------|-----|-----------|
| Bottle #1 | 18.0 | 12.5 | 7.4 | |
| Bottle #2 | 18.0 | 12.5 | 7.4 | |
| Bottle #3 | 18.0 | 19.5 | 9.4 | |
| Bottle #4 | 18.0 | 2.5 | 2.2 | |

2. Estimation of absorption and scattering coefficients of glass and ethanol for the simulation.

For calculation of the coefficients, the reflectance (R) and transmittance (T) of radiation can be estimated by reduced Kubelka-Munk model as shown below [1,2],

$$R = \frac{S_{KM}d}{S_{KM}d + 1}$$

$$T = \frac{1}{S_{KM}d + 1}$$

where S_{KM} is scattering coefficient, d is the thickness of the medium. The scattering coefficients of glass bottles were calculated from the reported R and T in the previous publication [3]. The absorption coefficient of glass was set to $20.8 \times 10^{-4} \text{ cm}^{-1}$ [4]. In the case of transparent ethanol solution, the absorption and scattering coefficients were set to 6.8×10^{-4} [5] and $2.5 \times 10^{-3} \text{ cm}^{-1}$ (assuming $T = 0.99$), respectively.

[1] Kubelka, P., 1948, "New Contributions to the Optics of Intensely Light-Scattering Materials. Part I," Journal of the Optical Society of America, 38, pp. 448-457.

[2] Kubelka, P. and Munk, F., 1931, "An Article on Optics of Paint Layers," Z. Tech.Physik, 12, pp. 593–601.

[3] Vicente de P. NICOLAU, Fernando P. MALUF, Vicente de P. NICOLAU, Fernando P. MALUF, PLEA 2001 - The 18th Conference on Passive and Low Energy Architecture, Florianópolis – BRAZIL, 7-9 November 2001

[4] Polyanskiy, M. N. Refractive index database. Available at <http://refractiveindex.info> (accessed Feb. 29, 2015)

[5] H.Cabrera, A.Marcano, Y.Castellanos, Condensed Matter Physics 2006, Vol. 9, No 2(46), pp. 385–389

3. Examination of whole generated photons in APO scheme using 4 different glass bottles.

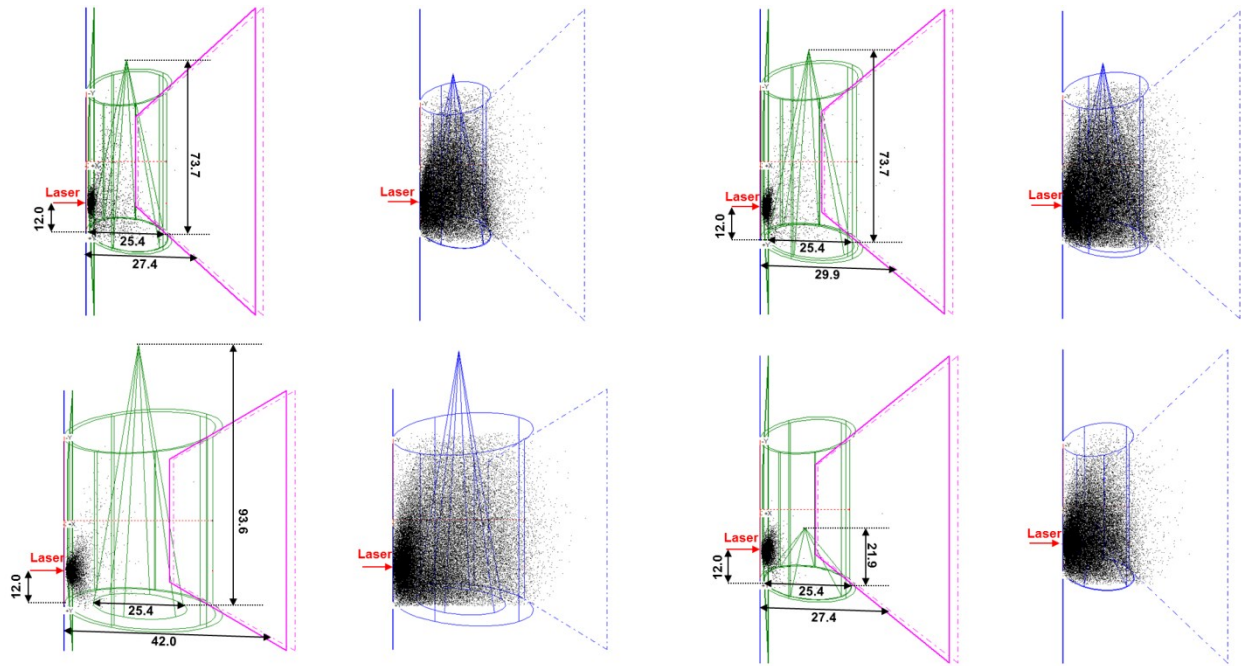


Figure S2. Three-dimensional distributions of total generated Raman photons of glass (left) and ethanol (right) in the measurements of 66% ethanol solution housed in the four different glass bottles at the offset distance of 12 mm. All dimensions are units of mm.