Electronic Supplementary Information (ESI) for

Localized flexible integration of high-efficiency surface enhanced Raman scattering (SERS) monitors into microfluidic channels †

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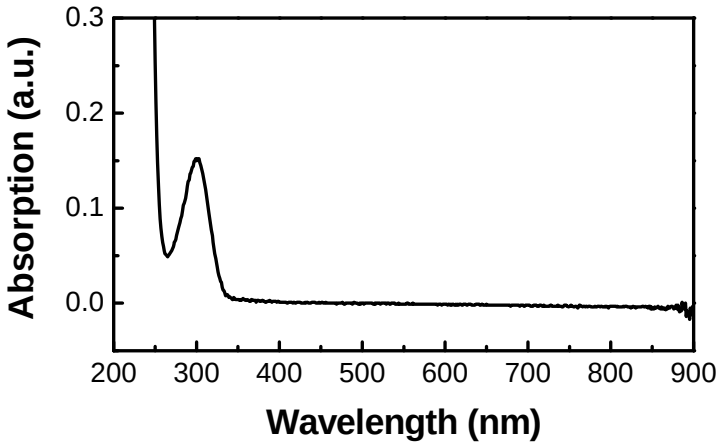


Fig. S1 Absorption spectrum of silver precursor used for laser processing.

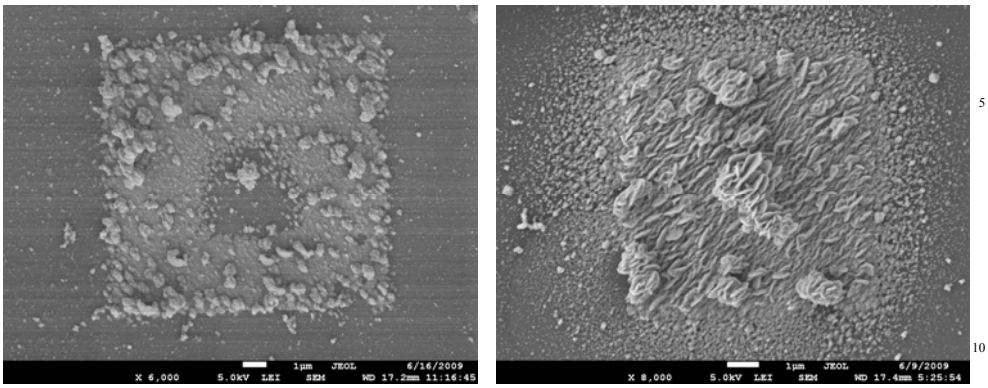
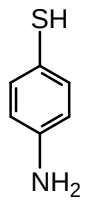
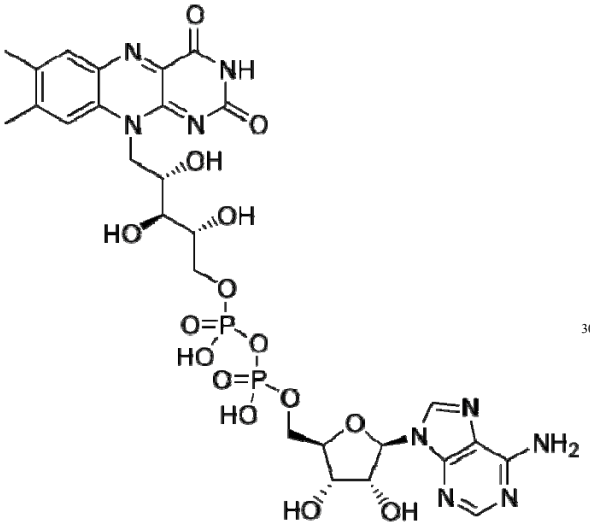


Fig. S2 SEM images of silver substrate fabricated with the laser power of (a) 3 mW, (b) 18 mW.



p-ATP



FAD

Scheme S1. Molecular structure of *p*-aminothiophenol (*p*-ATP) and flavin adenine dinucleotide (FAD).

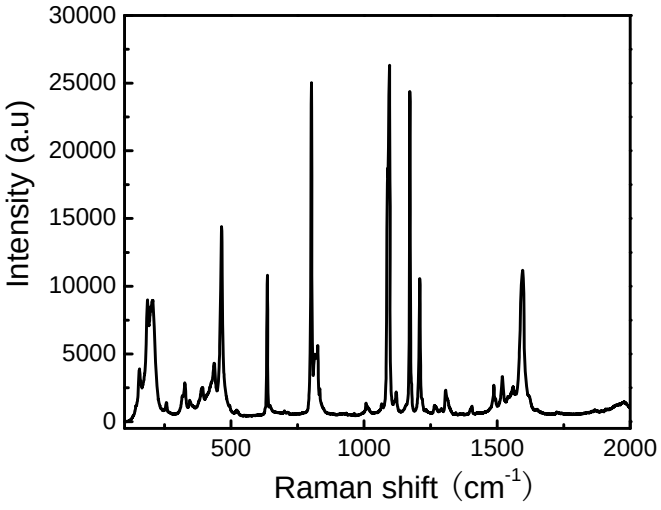


Fig. S3 Raman spectrum of *p*-ATP solid powder

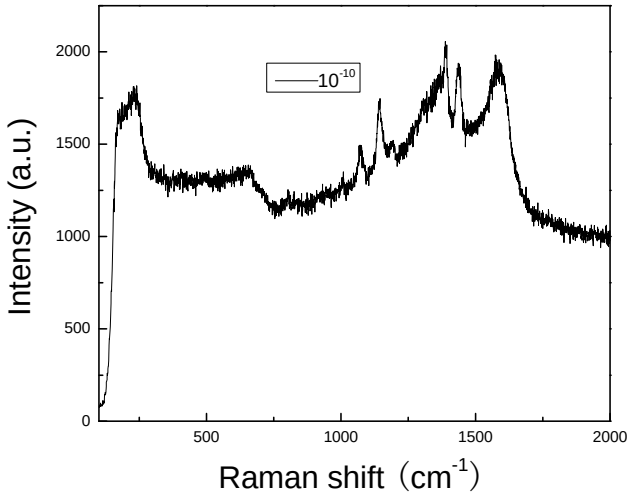


Fig. S4 SERS spectrum of *p*-ATP adsorbed on silver nanoplates(**10^{-10}M)**

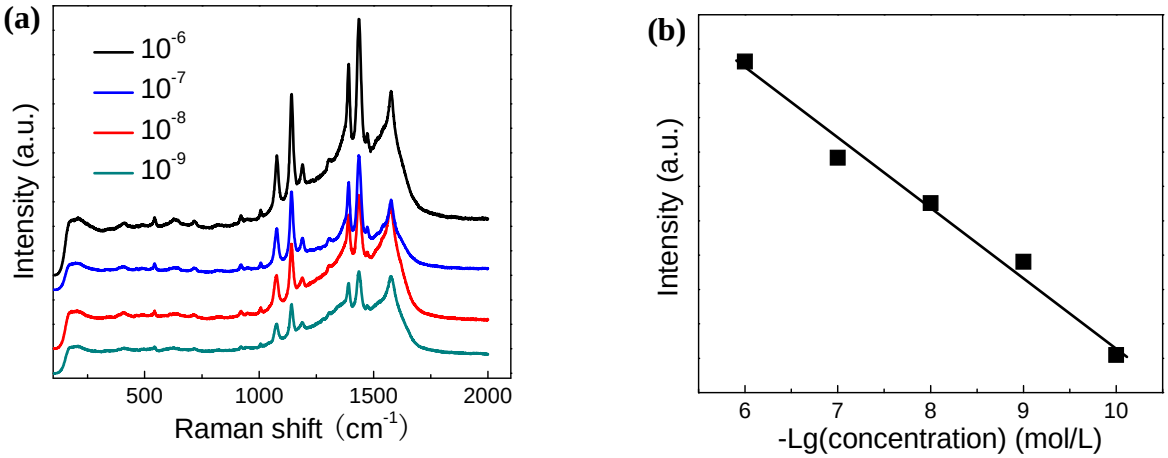


Fig. S5 (a) SERS spectrum of *p*-ATP adsorbed on silver substrate (10^{-6} ~ 10^{-9} M); (b) dependence of peak intensity (1075cm^{-1}) on the concentration of *p*-ATP (10^{-6} ~ 10^{-10} M).

Estimation of enhancement factor

Taking P-aminothiophenol (p-ATP) as test molecules, the enhancement factor (EF) of the samples was estimated, in order of magnitude, by the equation:

$$\mathbf{EF = (I_{SERS}/N_{ads})/(I_{bulk}/N_{bulk})} \quad [s1]$$

Where I_{SERS} and I_{bulk} are the Raman signals at a certain vibration for the p-ATP molecules adsorbed on a substrate with SERS effect and solid p-ATP molecules, respectively. N_{ads} and N_{bulk} are the numbers of the adsorbed and the solid p-ATP molecules within the laser spot, respectively. In our experimental condition for solid p-ATP, the probe volume could be considered to be a tube with a waist diameter of ~ 1.0μm and a depth of ~ 20μm. So we can calculate the N_{bulk} value, about 9.4×10^{10}. The N_{ads} can be calculated by dipping definite volume p-ATP/ ethanol solution (0.1 nM) on the substrate, estimating the existing area and the amount of molecule in the laser dot can be attained. We estimate the EF value, for the vibration at 1075 cm-1.

$$\mathbf{EF=4\times10^{8}}$$

[s1]Orendorff C J, Gole A, Say T K and Murphy C J, Anal. Chem 2005, 77, 3261-3266.