

# Supplementary Materials

## Analytical Enhancement Factor Calculation

Analytical enhancement factor (analytical EF) is estimated using the following equation [1]:

$$EF = \frac{I_{\text{SERS}} \times C_{\text{NR}}}{I_{\text{NR}} \times C_{\text{SERS}}} \quad (1)$$

where  $I_{\text{SERS}}$  and  $I_{\text{NR}}$  is the intensity of characteristic absorption peak in SERS and normal Raman (NR) measurements, respectively, and  $C_{\text{NR}}$  and  $C_{\text{SERS}}$  is the concentration of probe molecule in the NR and SERS measurements, respectively.

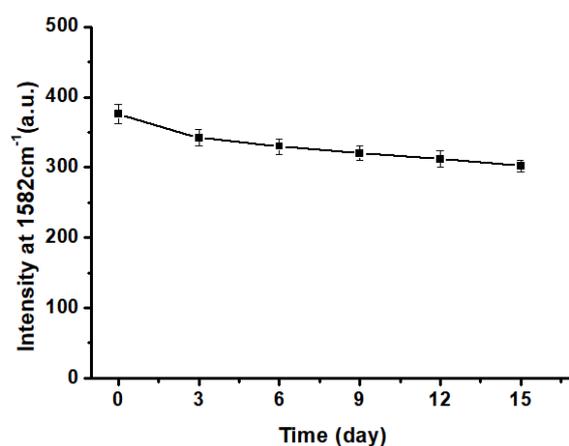


Figure S1. The stability and life-time of the Au@Ag NPs probes.

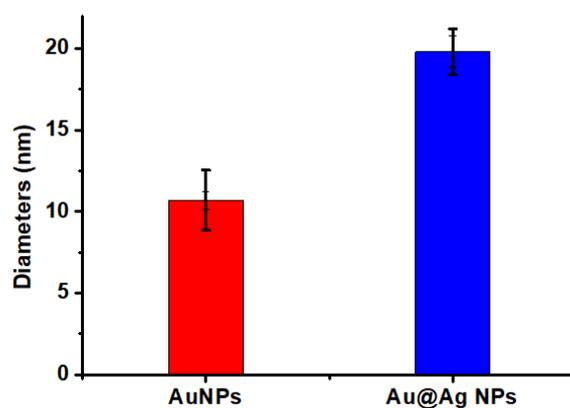


Figure S2. Statistical diameters of Au NP, Au@Ag NP according to TEM image.

## Reference

1. Qi, M.H.; Huang, X.Y.; Zhou, Y.J.; Zhang, L.Y.; Jin, Y.; Peng, Y.; Jiang, H.J.; Du, S.H. Label-free surface-enhanced Raman scattering strategy for rapid detection of penicilloic acid in milk products. *Food Chem.* 2016, 197, 723–729.