

Electronic Supporting Information

Facile Synthesis of Cu-Ag Hybrid Nanowires with Strong Surface-enhanced Raman Scattering Sensitivity

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4-ATP probe was used to verify the SERS activity of the Cu-Ag hybrid nanowires. Figure S3 demonstrates the SERS effect of as-synthesized Cu-Ag hybrid NWs. The Raman spectrum of 4-ATP on as-synthesized Cu-Ag hybrid NWs exhibited four b_2 modes at 1577, 1430, 1381, and 1145 cm^{-1} and one a_1 mode at 1080 cm^{-1} , which is quite similar to those of 4-ATP absorbed on Ag nanoparticles [1]. Compared to the spectrum obtained in the solid, the SERS spectrum obtained on the Cu-Ag hybrid NWs film shows distinct frequency shifts with significant changes in band intensity. The ν_{CS} band shifted from 1092 cm^{-1} to 1080 cm^{-1} , and another frequency shift from 1598 cm^{-1} to 1577 cm^{-1} was also observed, which was caused by the formation of strong Ag-S bonds between 4-ATP and Ag NPs [1].

The enhancement factor (EF) of the Cu-Ag hybrid nanowires on the R6G and 4-ATP molecules as calculated by the following equations.

$$EF = \frac{I_{\text{SERS}}}{I_{\text{BULK}}} \times \frac{N_{\text{BULK}}}{N_{\text{SERS}}} \quad \text{equation S1}$$

Where I_{SERS} , I_{BULK} are integrated intensities of the peak of R6G at 1650 cm^{-1} and that of 4-ATP at 1145 cm^{-1} , and N_{BULK} , N_{SERS} represent the molecule numbers of the solid R6G and surface-adsorbed molecules exposed to the laser illumination, respectively [2]. Under the estimation that R6G and 4-ATP was uniformly distributed on the surface of substrate, EF was estimated to be 5.6×10^5 and 4.5×10^6 for R6G and 4-ATP probes, respectively.

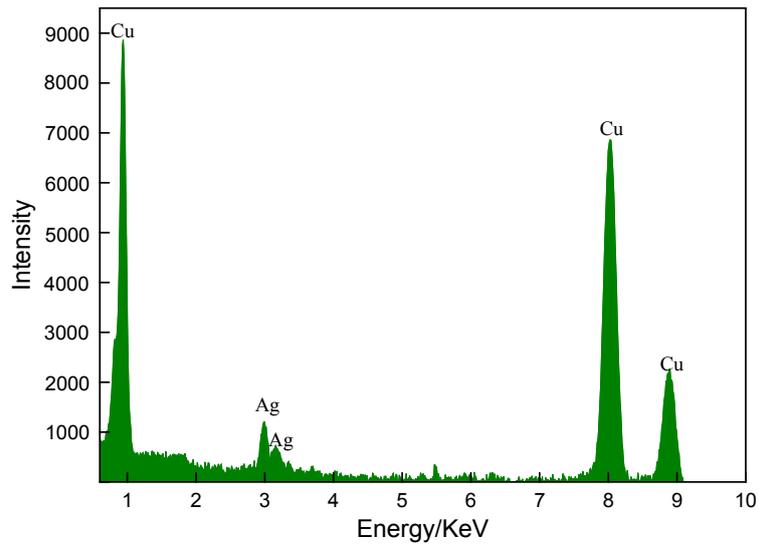


Figure S1 EDS analysis of Cu-Ag hybrid NWs in figure 2

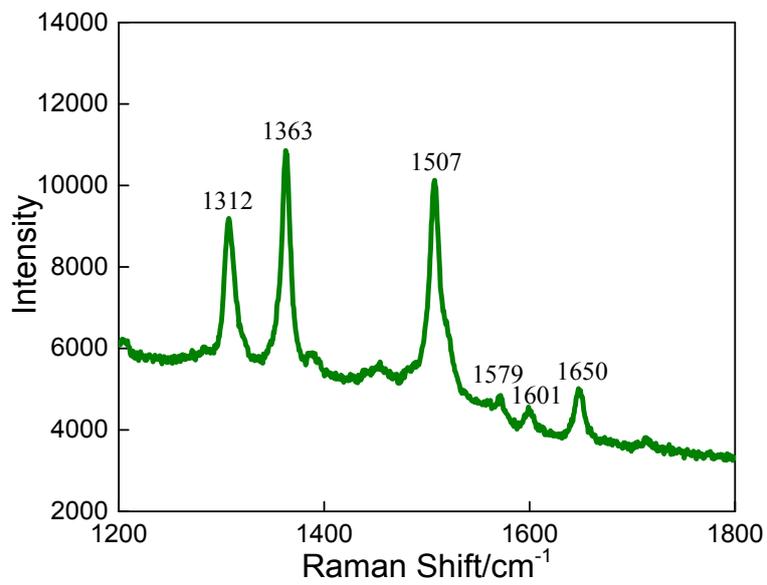


Figure S3 Raman spectra of R6G powder

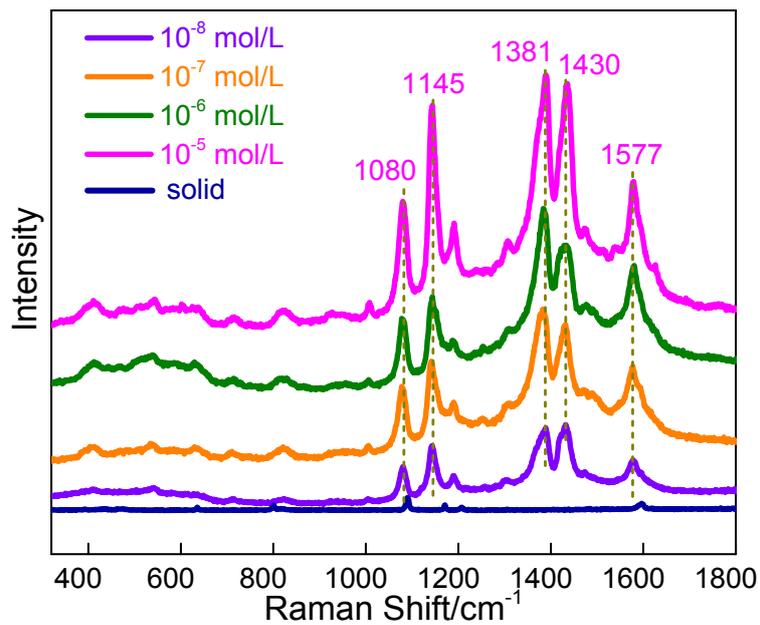


Figure S2 Raman Spectra of solid 4-ATP powder and 4-ATP ethanol solution with a series of concentration.

Reference:

- [1] L. Wang, H. Li, J. Tian and X. Sun, ACS Appl. Mater. Interfaces, 2010, 2, 2987-2991.
- [2] R. Ferrando, J. Jellinek and R. L. Johnston, Chem. Rev., 2008, 108, 845-910.