

Electronic Supplementary Information

1. Experimental procedures

Materials: Ultrapure water was used in all of the experiments. Gold(III) acetate ($\text{Au}(\text{ac})_3$ 99.9%) was purchased from Alfa Aesar. AgNO_3 of analytical grade was purchased from Sinopharm Chemical Reagents. NADPH (reduced β -nicotinamide adenine dinucleotide 2'-phosphate tetrasodium salt) was purchased from Biomol. The Amicon centrifugal filter units were purchased from Millipore.

Synthesis of Au-Ag Alloy Nanoparticles: 0.01 g $\text{Au}(\text{ac})_3$ was dissolved in 100 mL ultrapure water to get 0.01% aqueous $\text{Au}(\text{ac})_3$ solution. $\text{Au}(\text{ac})_3$ and AgNO_3 were mixed together in 2 mL ultrapure water. In a total ion concentration of 4×10^{-4} mol/L, the gold mole fractions of added metal ions (χ_{Au}) were 0, 0.25, 0.5, 0.75 and 1 respectively. Then certain amounts of NADPH were added to the solution. The amounts of NADPH were listed as following:

χ_{Au}	0	0.25	0.5	0.75	1
NADPH (mg)	0.5	0.75	1	1.25	1.5

The mixture was gently stirred for 24 h at room temperature. The products were purified using an Amicon centrifugal filter unit (molecular-weight cut-off (MWCO) =10 kDa) and then dispersed in water. The alloy nanoparticles were freeze-dried to obtain the powder for further characterization.

Characterization Methods: The transmission-electron-microscopy (TEM) images were obtained using a JEOL JEM-1230 transmission electron microscope at 100 kV. Samples for TEM were prepared by dropping 5 μL of a solution of the Au clusters onto a Formvar coated copper grid and allowing it to dry. High resolution Transmission electron microscopy (HRTEM) images were taken on JEOL JEM-2010FEF transmission microscopy at 200 kV. Samples for HRTEM were prepared on ultrathin-carbon-coated grids in the same way mentioned above. X-ray diffraction (XRD) data were recorded on Bruker AXS D8 advance X-ray diffractometer. Samples of AuNPs solution were dropped on the substrate and allowed to dry as a uniform thin film. The XPS data were recorded using a Kratos XSAM 800 X-ray photoelectron spectrometer. The binding energy of the XPS data was referenced to the C 1s of aliphatic carbon at 284.8 eV. The FTIR spectra were recorded using a Nicolet Nexus 670 infrared spectrometer.

2. Supporting Figures

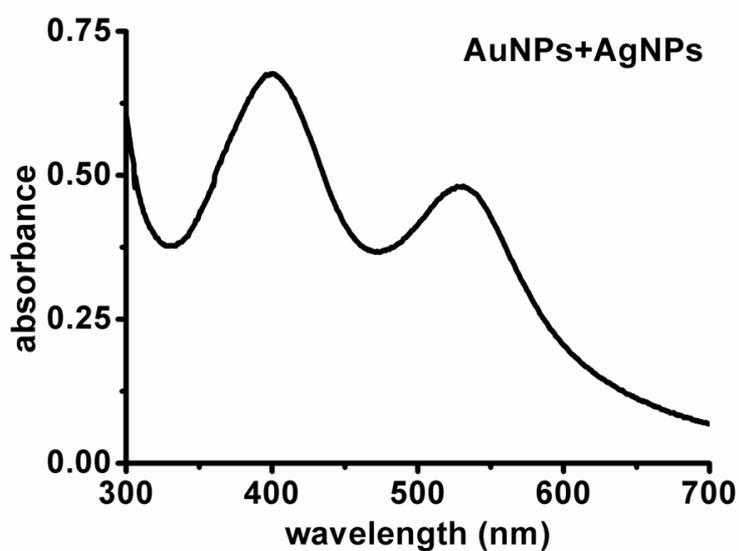


Fig. S1 UV-vis spectrum of mixture solution of AuNPs and AgNPs in equimolar amounts.

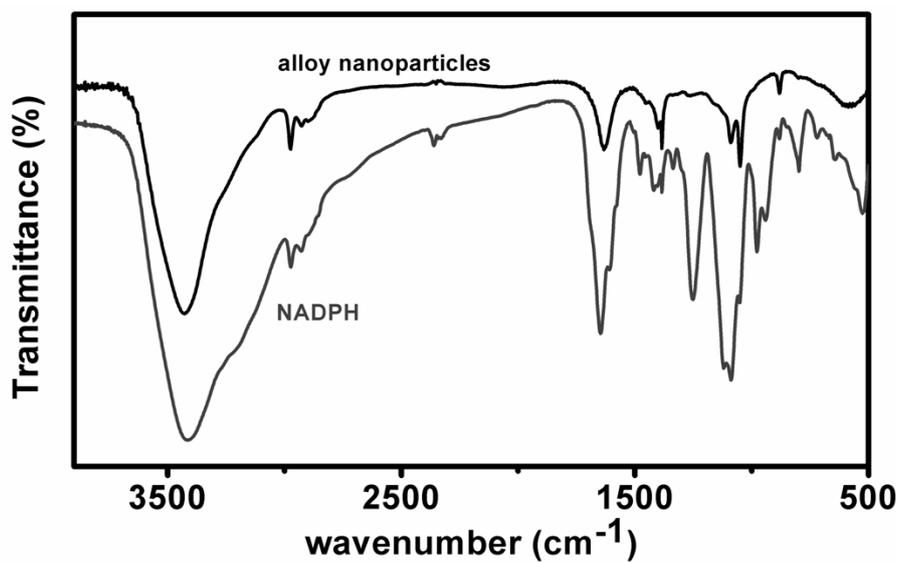


Fig. S2 Infrared spectra of pure NADPH and Au-Ag alloy nanoparticles ($\chi_{\text{Au}} = 0.5$).

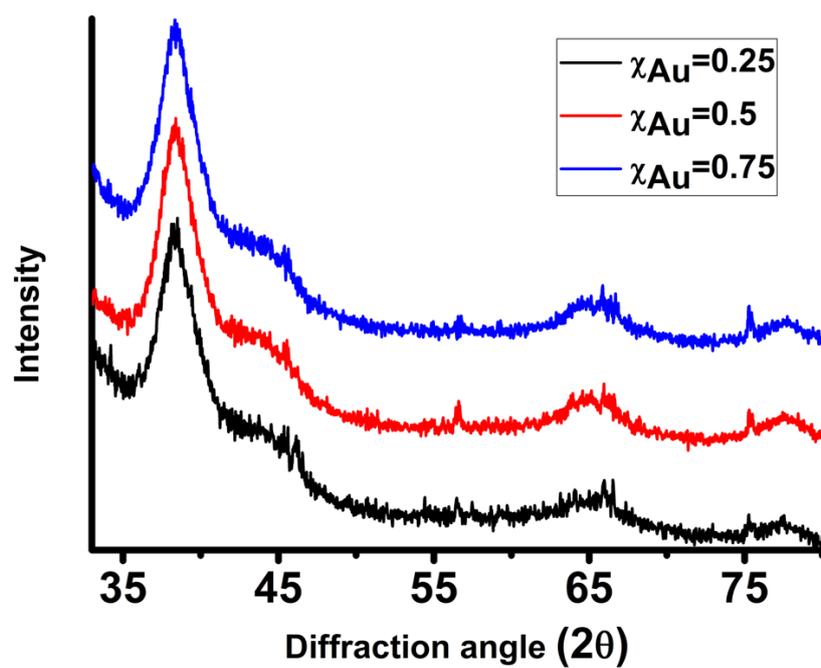


Fig. S3. XRD patterns of Au-Ag alloy nanoparticles on glass substrates.

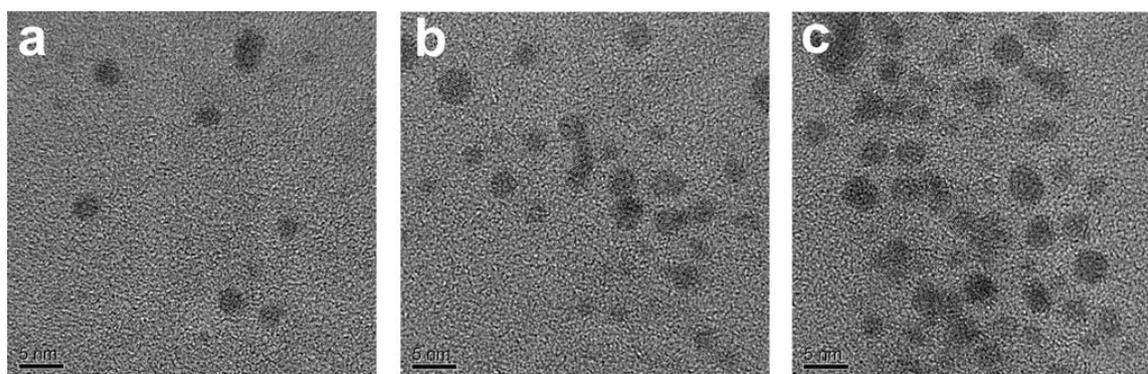


Fig. S4. High resolution TEM image of Au-Ag alloy nanoparticles. (a) $\chi_{Au} = 0.25$, (b) $\chi_{Au} = 0.5$, (c) $\chi_{Au} = 0.75$.