Electronic Supplementary Information for

Facile Synthesis of Gold and Gold-Based Alloy Nanowire Networks Using Wormlike Micelles as Soft Template

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Materials. 3-(N,N-Dimethylpalmitylammonio)propanesulfonate (99%), Chloroauric acid (AR), ascorbic acid (99%) and sodium borohydride (96%) were purchased from J&K Scientific Ltd.. All the above materials were used without further purification. Deionized water was used throughout the experiment. All chemicals were analytical grade and used as received.

Characterization

The gold and gold-based alloy nanowires were characterized using transmission electron microscopy (TEM) (JEM-100CX II (JEOL)), high resolution TEM (HRTEM) (JEM-2100) and scanning electron microscopy (SEM) (JEOL JSM-7600F). The wormlike micelles were characterized using Cryogenic temperature-transmission electron microscopy (cryo-TEM).

The cryo-TEM samples were prepared in a controlled environment vitrification system (CEVS) at 25 ºC. A micropipette was utilized to load 5 μL of the solution onto a TEM carbon grid, which was blotted with two pieces of filter paper, resulting in the

formation of thin films suspended on the mesh holes. After waiting for about 5 s, the samples were quickly plunged into a reservoir of liquid ethane (cooled by nitrogen) at -165 ºC. The vitrified samples were then stored in liquid nitrogen until they were transferred to a cryogenic sample holder (Gatan 626) and examined with a FEI Tecnai 20 TEM (120 kV) at about -174 ºC. The images were recorded on a Gatanmultiscan CCD and processed with a Digital Micrograph. The cryo-TEM observations were performed at the Center for Biological Imaging (CBI), Institute of Biophysics, Chinese Academy of Science.

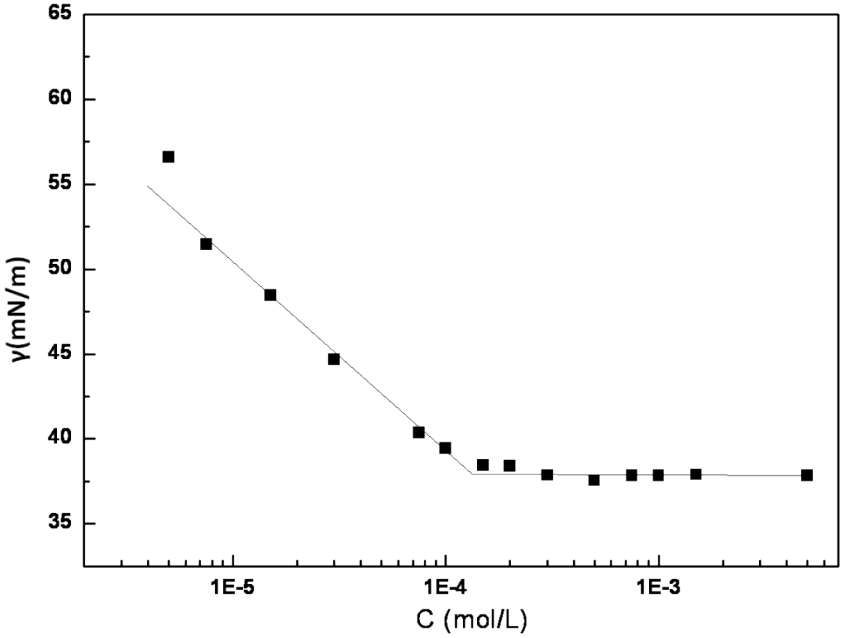

Fig. S1 Surface tension of $HAuCl_4$-PAPS aqueous solutions at 25 °C.

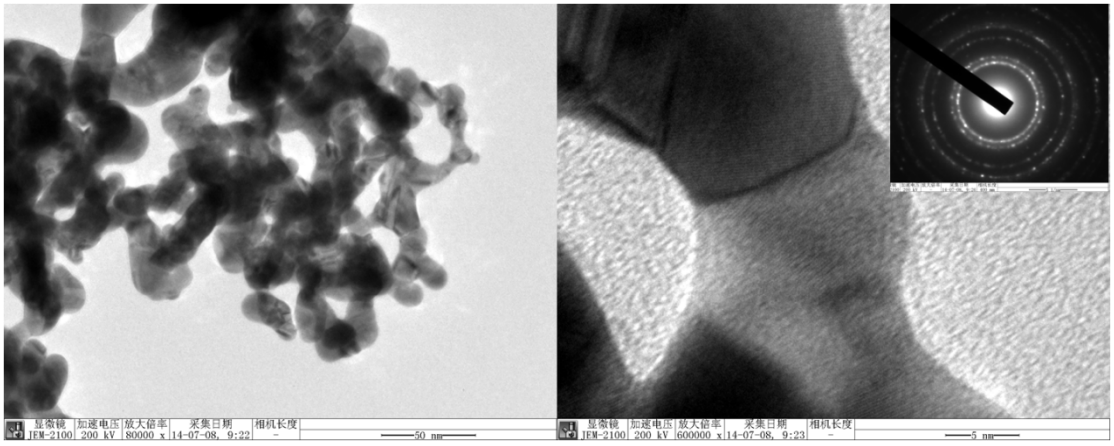

Fig. S2 HRTEM images of Au nanowire networks. The inset shows the corresponding electron diffraction pattern.

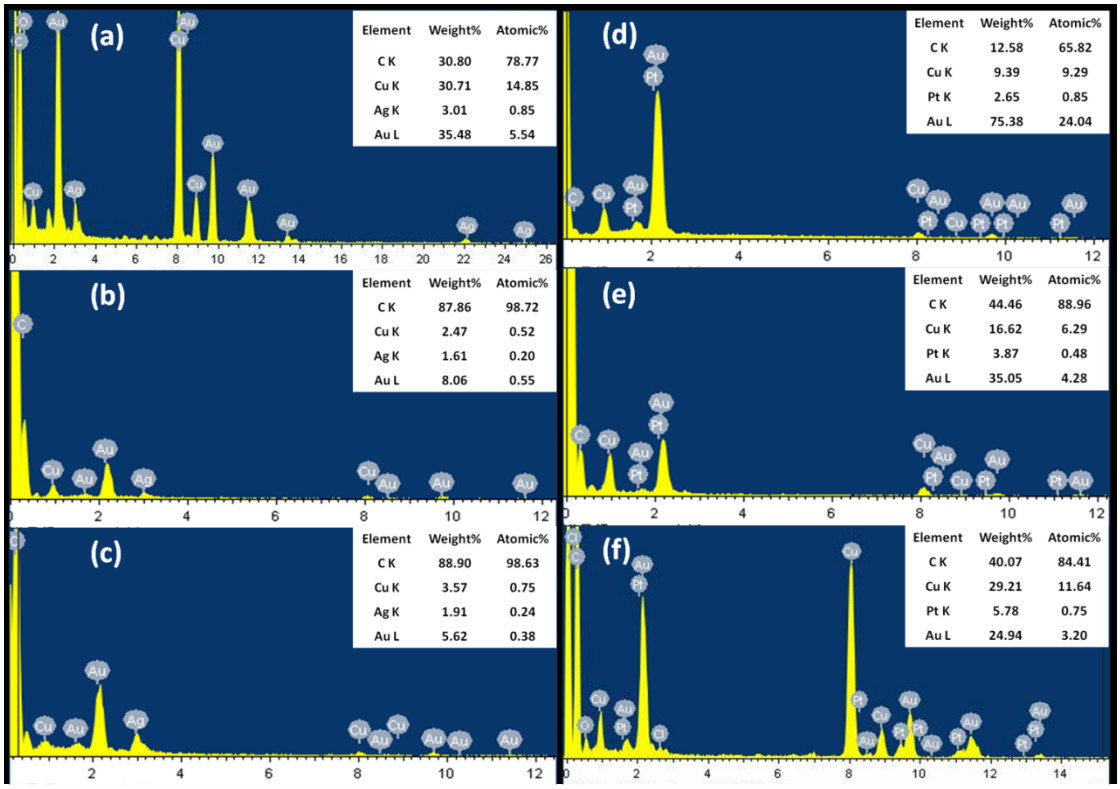

Fig. S3 EDX results for AuAg and AuPt nanowire networks. $Ag^{+}/AuCl_4^{-}$ precursors ratio for a, b and c is 1/4, 1/2 and 2/3 respectively. $PtCl_6^{2-}/AuCl_4^{-}$ precursors ratio for d, e and f is 1/4, 1/2 and 2/3 respectively.

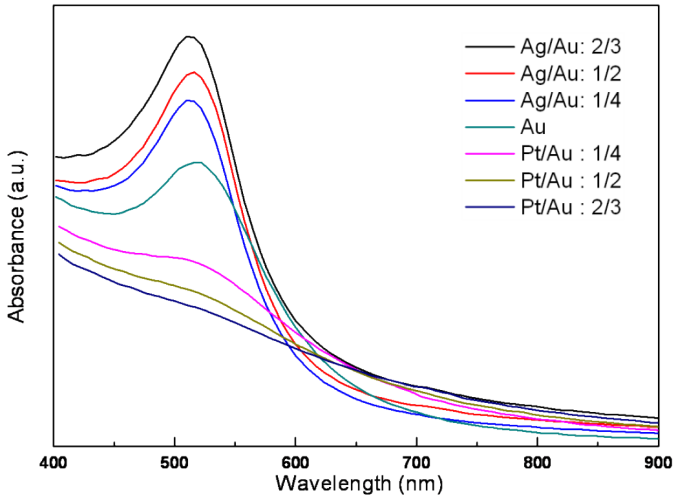

Fig. S4 UV-vis spectra of Au nanowires and AuAg, AuPt alloy nanowires.