

## Supporting Information

### Ultrathin Au-Ag bimetallic nanowires with Coulomb blockade effects

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### Experimental Details

**Synthesis:** All the reagents used in this work, including H<sub>2</sub>AuCl<sub>4</sub>•4H<sub>2</sub>O, AgNO<sub>3</sub>, octadecylamine (ODA), ethanol and cyclohexane, were of analytical grade obtained from the Beijing Chemical Factory of China and were used without further purification. In a typical synthesis of Au-Ag bimetallic nanowires, 0.02 g H<sub>2</sub>AuCl<sub>4</sub>•4H<sub>2</sub>O and 0.02 g AgNO<sub>3</sub> were added into 10 ml ODA at 90 °C. After 1 min of magnetically stirring, the solution was kept at 90 °C for 4 h without stirring. The products were collected and then washed with ethanol for several times.

**Characterization:** The size and the morphology of as-synthesized samples were determined by using Hitachi model H-800 transmission electron microscope and JEOL-2010F high-resolution transmission electron microscope. The energy dispersive spectroscopy was recorded to determine the composition of the products. High-resolution transmission electron microscopy observations were performed by using a FEI Titan 80–300 transmission electron microscope equipped with a spherical aberration (Cs) corrector for the objective lens.

**STM measurements:** the nanowires were dispersed on a highly ordered pyrolytic graphite (HOPG) substrate. The scanning tunneling microscope (STM) system was an ultrahigh vacuum four-probe SPM from UNISOKU. The STM tips used were chemical corrosion from a wire of Pt (80%) Ir (20%) alloys. All the STM and scanning tunneling spectroscopy (STS) measurements were performed at the liquid-nitrogen temperature. The images were taken in a constant-current scanning mode with tunneling currents of 0.2 - 0.8 nA and bias voltages range from 120 to 170 mV. Lateral dimensions observed in the STM images were calibrated with HOPG standard.

### Supplementary Figures

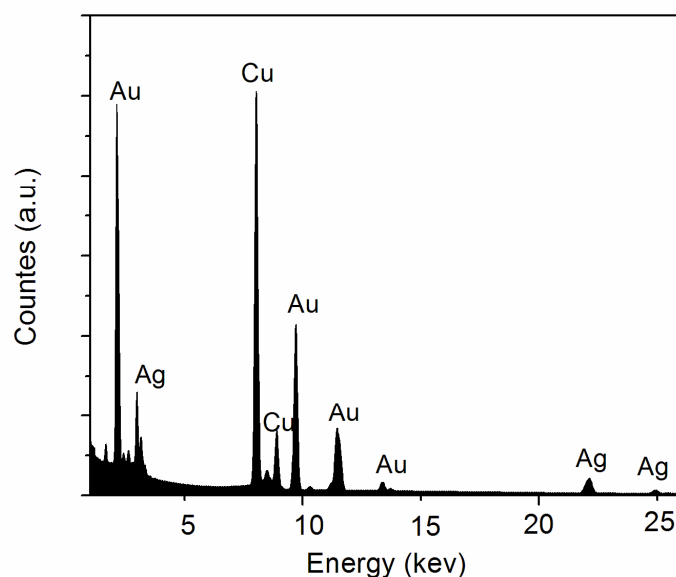


Figure S1. EDS analysis of the Au/Ag bimetallic nanowires. The Cu signal was from the copper grid.

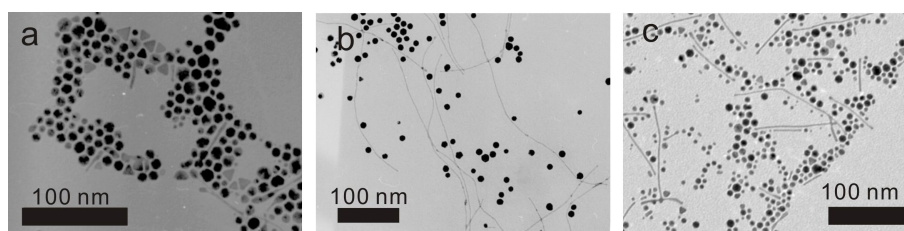


Figure S2. Typical TEM images of products obtained from the same synthesis but at different temperatures. (a) 80 °C, (b) 100 °C, (c) 120 °C.

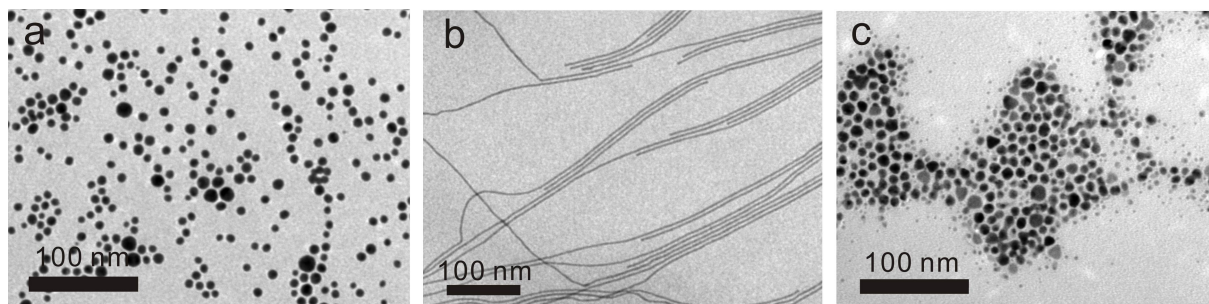


Figure S3. Typical TEM images of products obtained from the same synthesis but at different reactant concentrations. (a) 0.02g HAuCl<sub>4</sub>·4H<sub>2</sub>O, (b) 0.02g HAuCl<sub>4</sub>·4H<sub>2</sub>O and 0.005g AgNO<sub>3</sub>, (c) 0.02g HAuCl<sub>4</sub>·4H<sub>2</sub>O and 0.2g AgNO<sub>3</sub>.

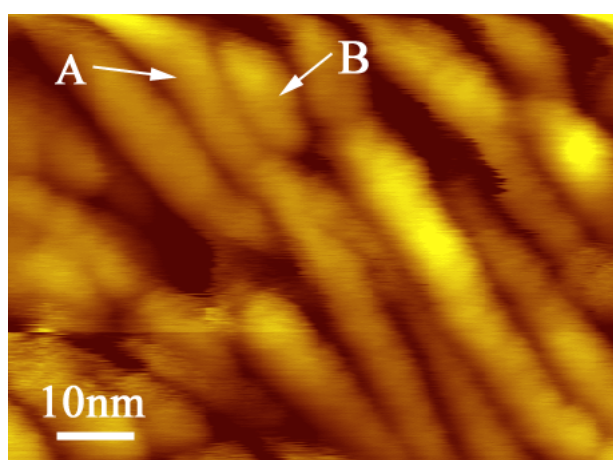


Figure S4. Constant-current scanning mode STM image of Au-Ag nanowires on HOPG substrate.  
 $V_{Bias} = -1.50V$  and  $I = 0.485nA$ .