Supporting Information for

A General and Rapid Approach to Hybrid Metal Nanoparticle-ZnO Nanowire Arrays and Their Use as Active Substrates for Surface-Enhanced Raman Scattering Detection

Qiyan Hu,[a,b] Xiaowang Liu,[a] Chaoting Wu,[a] Qing You,[a] Tianchao Shi[a] and Wu Zhang*[a]

a. College of Chemistry and Materials Science, Anhui Normal University, Key Laboratory of Functional Molecular Solids, Ministry of Education, Anhui Laboratory of Molecule-Based Materials, Wuhu 241000, P.R. China

b. College of Pharmacy, Wannan Medical College, Wuhu 241002, PR China.

*E-mail: zhangwu@mail.ahnu.edu.cn

Contents

Fig. S9. SERS spectra of Rh 6G (5 μL, 1×10^{-12} M) probed from 60 points obtained by using the line-mapping mode at a 1 μm step size from a Ag-ZnO@Zn array (a) and histograms of the intensities of the main Raman vibrations at (b) 1367, (c) 1515 and (d) 1654 cm^{-1}.

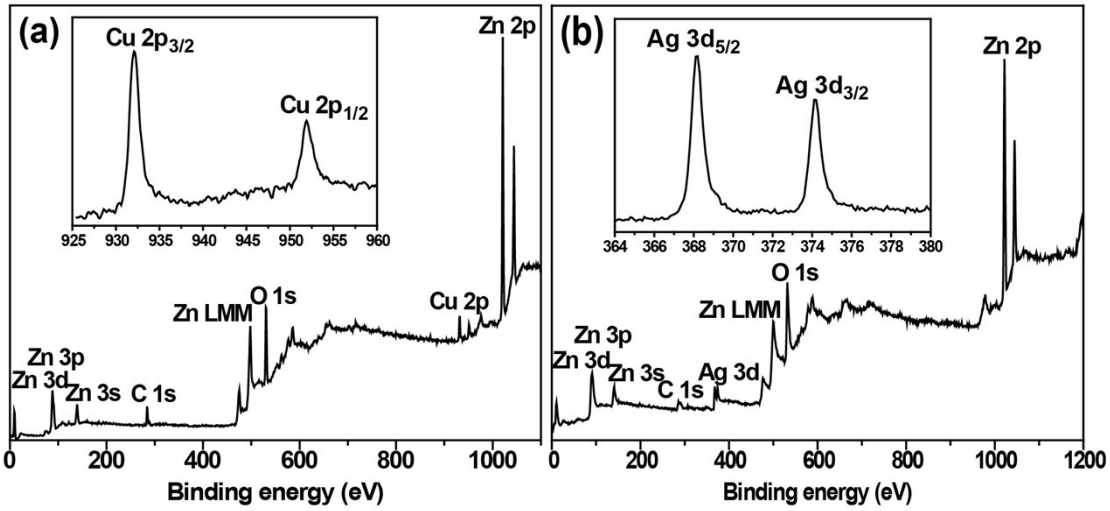

Fig. S1. XPS spectra of Cu-ZnO@Zn (a) and Ag-ZnO@Zn (b) by using a monochromated x-ray source. Insets: XPS profiles of Cu 2p and Ag 3d.

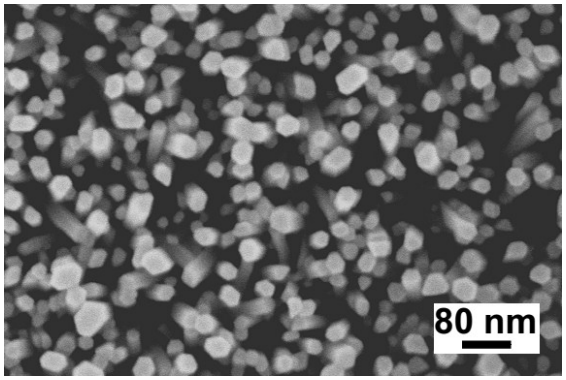

Fig. S2. SEM image of ZnO NW arrays grown on ITO (top-view) after being immersed into an aqueous solution of $CuCl_2$ (5 mM) for 15s.

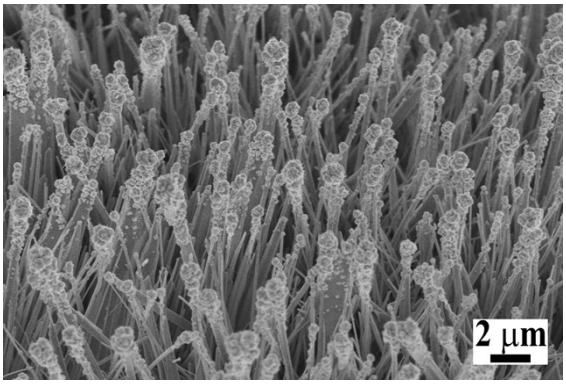

Fig. S3. SEM image of annealed ZnO@Zn NW arrays (400 °C, 5 h under atmosphere) grown on the Zn foil after being immersed into an aqueous solution of $CuCl_2$ (5 mM) for 15s.

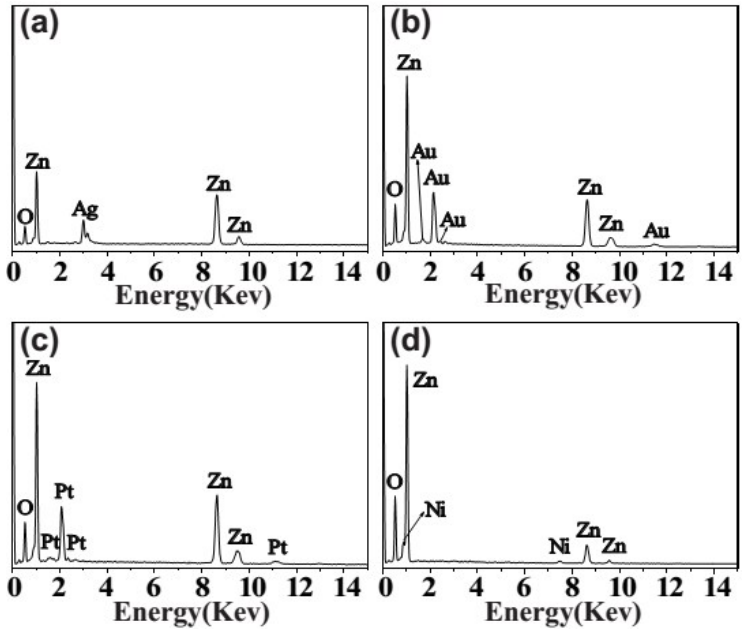

Fig. S4. EDS spectra of hybrid metal-ZnO NW arrays (metal = Ag, Au, Pt and Ni) prepared by inserting ZnO@Zn arrays into corresponding metal precursor solution for 15s.

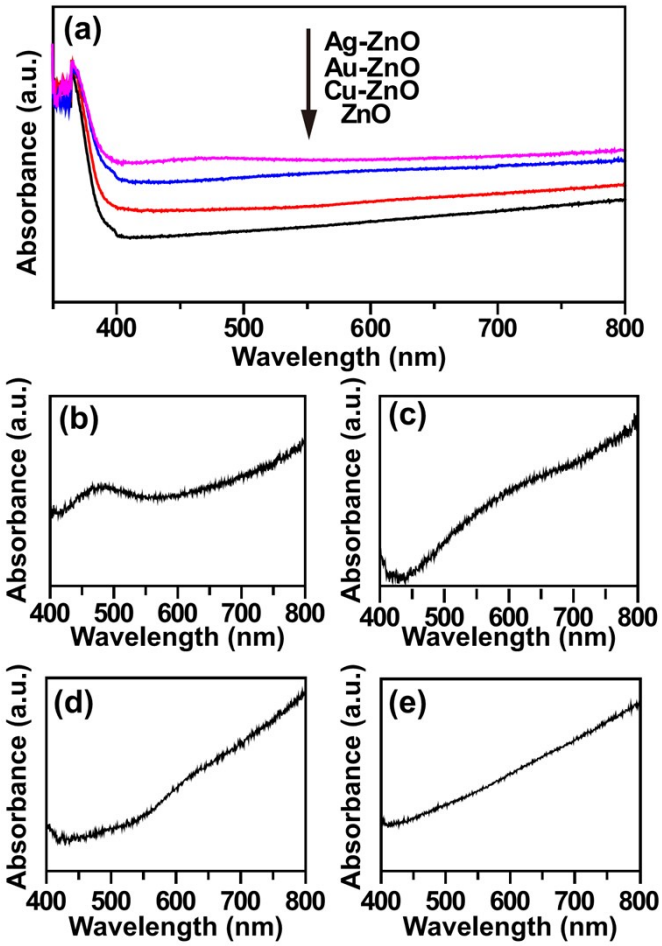

Fig. S5. UV-Visible absorption profiles of metal-ZnO NW arrays. Note that all hybrid ZnO NW arrays were prepared by inserting the ZnO@Zn substrates into corresponding metal ion solution for 15 s. (b)-(e) Enlarged absorption profiles for Ag-ZnO@Zn, Au-ZnO@Zn, Cu-ZnO@Zn and pure ZnO@Zn.

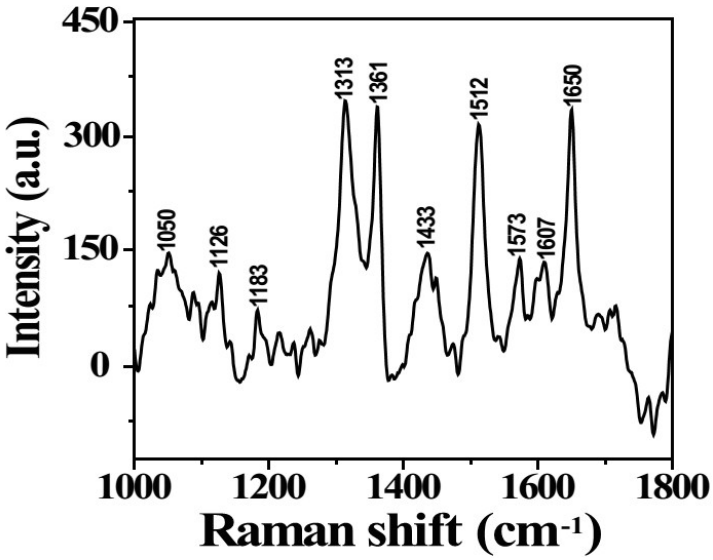

Fig. S6. Raman spectrum of Rh 6G (5 μL, 10^{-2} M) by using a ZnO@Zn array (no SERS effect) as the substrate for the measurement.

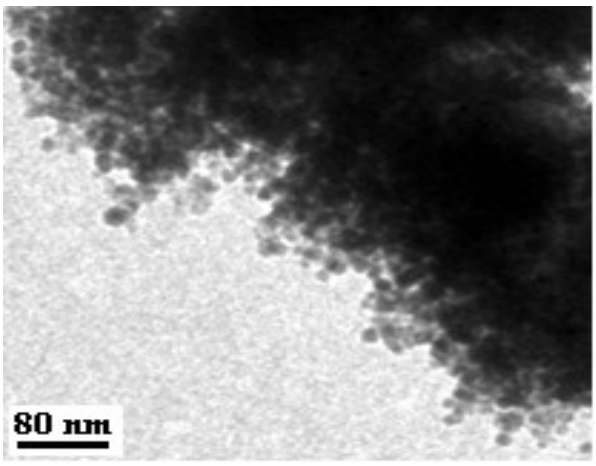

Fig. S7. Close TEM observation of a nanowire obtained from the hybrid Ag-ZnO NW array. The image indicates that the surface of the nanowire is formed by the aggregation of Ag nanoparticles.

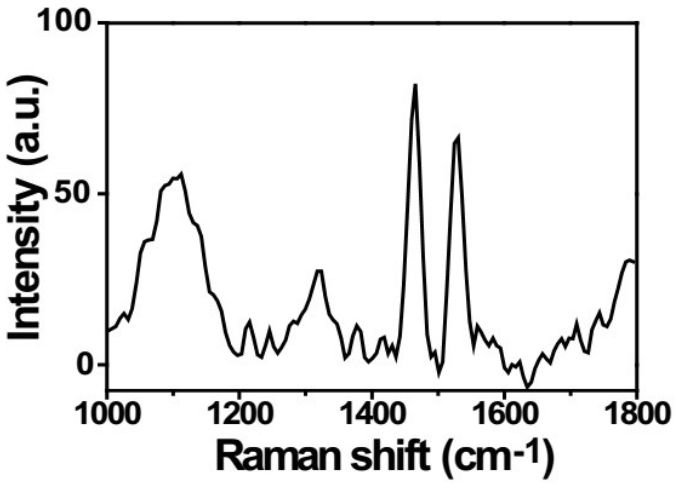

Fig. S8. The Raman spectrum of pure ZnO@Zn. Note that the bands may derive from the scattering of the ZnO NWs or Zn foil.

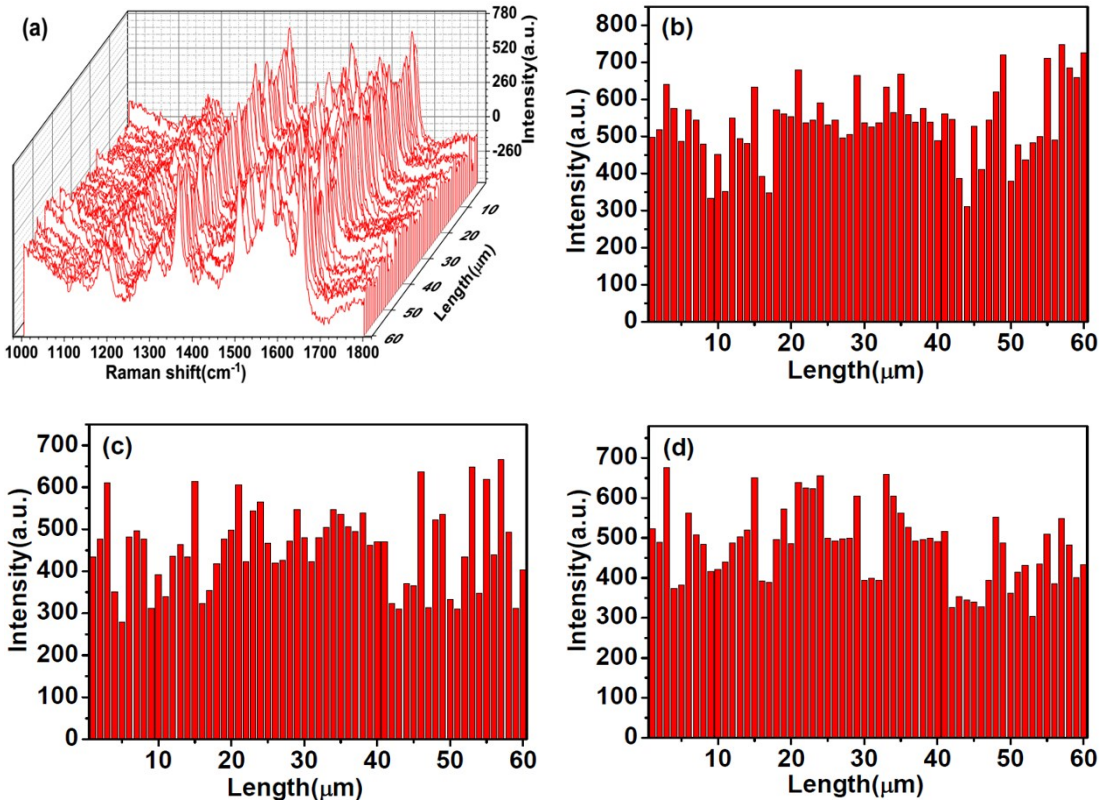

Fig. S9. SERS spectra of Rh 6G (5 μL, 1×10^{-12} M) probed from 60 points obtained by using the line-mapping mode at a 1 μm step size from a Ag-ZnO@Zn array (a) and histograms (b-c) of the intensities of the main Raman vibrations at 1367, 1515 and 1654 cm^{-1}, respectively.