Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics

Supporting Information

Strong Optical Coupling between Mutually Orthogonal Plasmon Oscillations in a Silver Nanosphere-Nanowire Joined System

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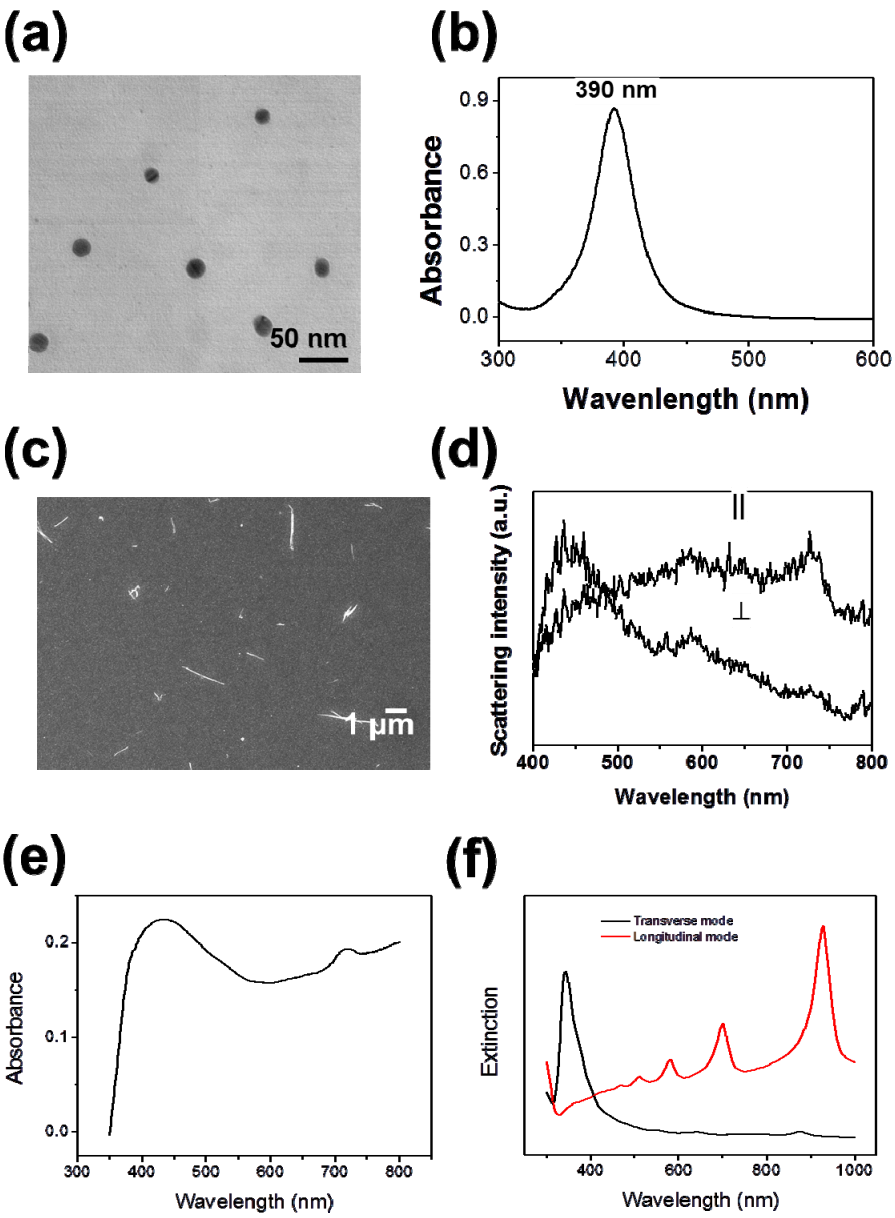
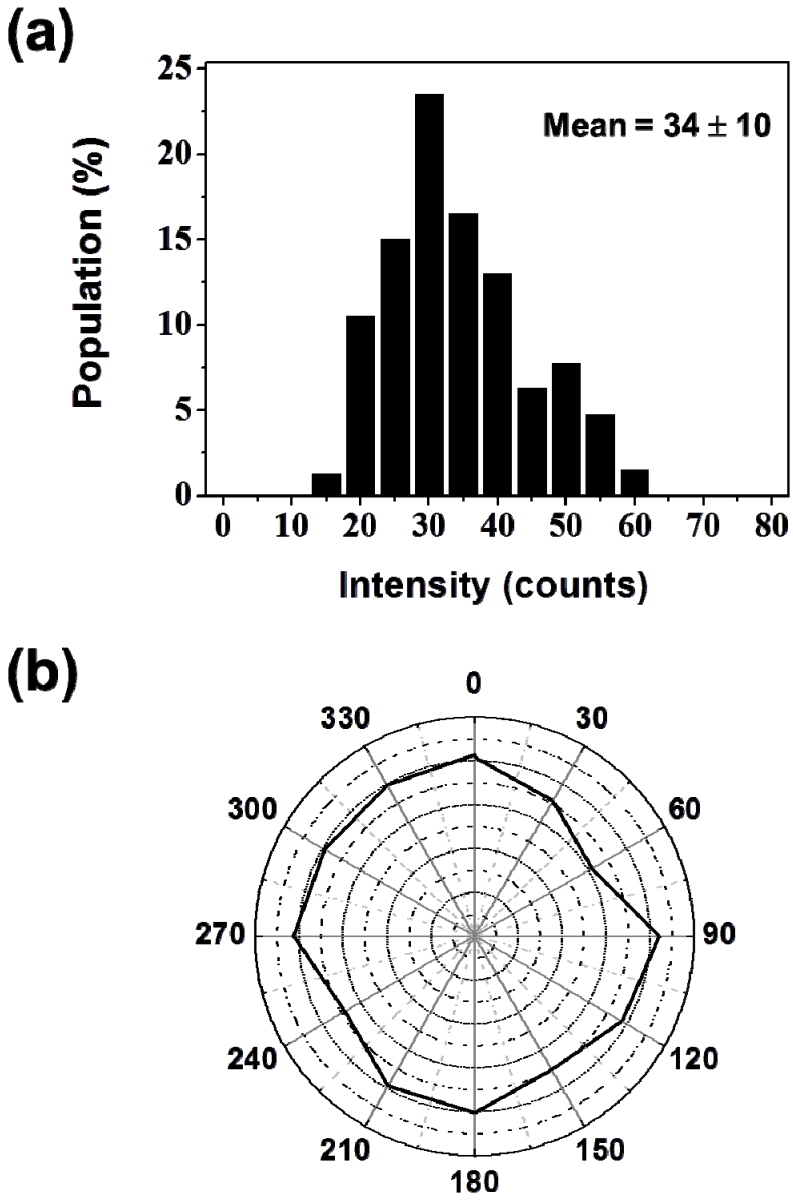
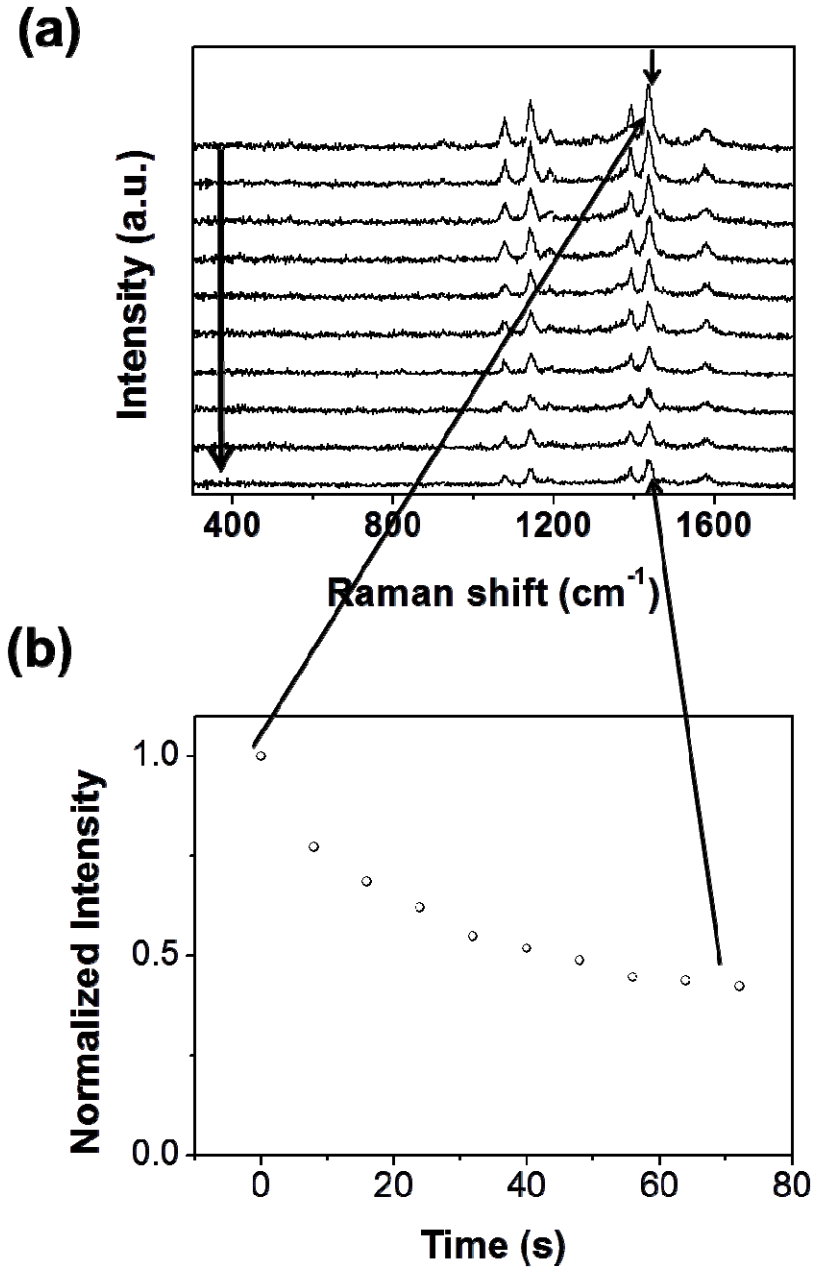


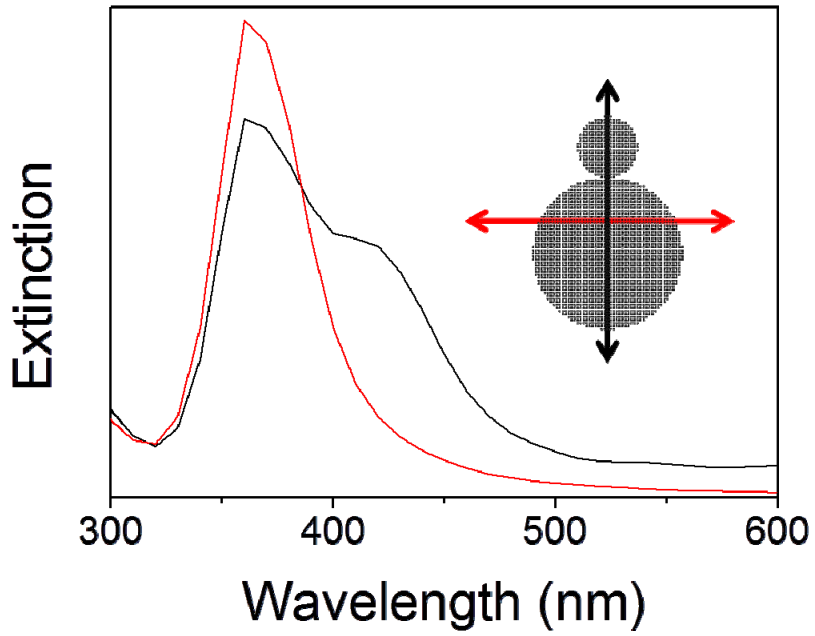
SI Figure 1. (a) A TEM image of silver nanospheres exhibiting homogeneous size with diameter of 20 ± 4 nm. (b) The UV-visible absorption spectrum of silver colloidal nanospheres in aqueous medium. (c) An FE-SEM image of silver nanowires exhibiting the diameter of 50 ± 4 nm and the length varied broadly from 1 to 2 μm. (d) Dark field scattering spectra of a silver nanowire with two different polarizations of scattered lights. (e) UV-Visible absorption spectrum of silver nanowire dispersion solution. (f) Extinction spectra of a silver nanowire calculated by a DDA package (ref. 34). Diameter is 50 and length is 1.5 μm. Distance between discretized dipole was set to be 3 nm.



SI Figure 2. (a) The SERS intensity distribution of the 1428-cm^{-1} band obtained from an area off the silver nanowire, where only silver nanospheres exist. Average intensity was 34 counts and standard derivation was 10 counts. (b) Angular intensity distribution of this band at a certain position.



SI Figure 3. SERS intensity changes with time under photo-illumination of the 514.5-nm laser line. (a) Sequential SERS spectra obtained at position B in Figure 2b. (b) Temporal profile of SERS intensity (normalized to unity) read for the 1428 cm^{-1} band.



SI Figure 4. Extinction spectra of two silver nanoparticles in contact calculated by a DDA package (ref. 34). Diameters of the two spheres are 50 and 20 nm. Distance between discretized dipole was set to be 1 nm and 71011 dipoles were used for two spheres. The red curve corresponds to the electric field perpendicular to the inter-particle axis, and the black one parallel to the axis.