

Electronic Supplementary Information

Materials and methods

Firstly, 25.0 ml of aqueous 25×10^{-3} M gold chloride ($\text{HAuCl}_4 \cdot 3\text{H}_2\text{O}$, Sigma Aldrich, 99.9%) and 2.5×10^{-3} M silver nitrate (AgNO_3 , Sigma Aldrich, 99.0%) were prepared using deionized (DI) water ($\rho > 18.0 \times 10^6 \Omega \cdot \text{cm}$). Separately, aqueous 35×10^{-3} M sodium citrate ($\text{Na}_3\text{C}_6\text{H}_5\text{O}_7 \cdot 2\text{H}_2\text{O}$, Sigma Aldrich, 99.0%) and 100×10^{-3} M ascorbic acid ($\text{C}_6\text{H}_8\text{O}_6$, Fermont, Mexico) solutions were prepared using DI water.

For preparing Au seed particles, 0.5 ml of gold chloride solution were added to 40 ml of DI water and heated to 90°C in a round bottom flask under magnetic agitation. On reaching the solution temperature 90°C , 2.0 ml of sodium citrate solution was added. The mixture was kept at this temperature for 15 minutes. The color of the reaction mixture turned from light yellow to pink, manifesting the formation of Au nanoparticles. Then, the colloidal solution was quenched to 20°C by immersing the reaction flask in cold water. The resulting colloidal sample was preserved in a refrigerator (10°C), after covering the sample with silver foil (to avoid light). Transmission electron microscopy revealed the formation of highly monodispersed spherical Au nanoparticles with an average size of about 18.0 nm (Figure S1a).

For the synthesis of core (Au) – shell (Ag) nanoparticles with different shell thicknesses, 8.0 ml of the previously prepared Au seed solution was mixed with 30 ml of DI water in a round bottom flask. The mixture was heated to 90°C under magnetic stirring. After keeping

the solution at this temperature for about 2 min, a fixed volume of the previously prepared silver chloride solution was added. After about 5 min, a fixed volume of the sodium citrate solution and a fixed volume of the ascorbic acid solution were added successively. The formation of Ag shell layer over the Au seed particles could be noted through the color change of the colloidal reaction solution from pink to reddish yellow. After keeping the reaction at 90 °C for about 20 min, the mixture was cooled to 20 °C by immersing the reaction flask in cold water. The resulting colloidal samples, covered with silver foil, were preserved in a refrigerator (10 °C). Different shell thicknesses were achieved by using different amounts of silver chloride solutions while keeping the volume of the seed solution fixed. Depending on the volume of the silver ion solution in the reaction mixture, different amounts of sodium citrate and ascorbic acid solutions were used, to keep the molar ratio of silver ion, sodium citrate and ascorbic acid in the reaction mixture fixed (for all the samples). Typical TEM micrographs of the synthesized Au seed particles and core (Au) – shell (Ag) particles are shown in Figure S1. While the average diameter of the seed particles was about 18.0 nm, the thickness of the Ag shell for that particular sample was about 4.5 nm. The Au-core particles have a nearly-spherical shape with only about 4.7 % size dispersion, as can be seen in the inset of Fig. S1.

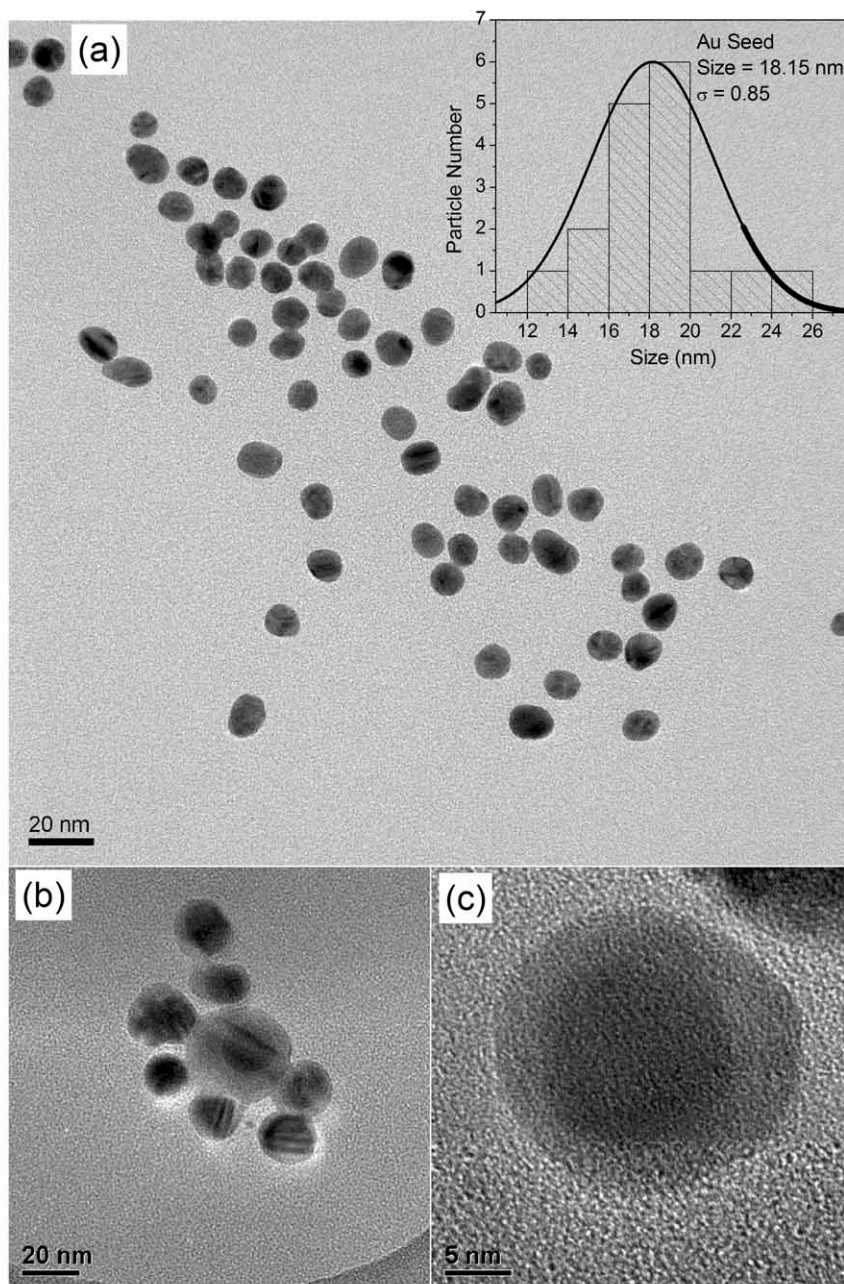


Figure S1. Typical TEM micrographs of the Au-core (seed) particles (a), and core (Au) – shell (Ag) Fano-plasmonic particles (b & c) of about 18.0 nm core size and about 4.5 nm shell thickness.