Plasmonic Color-Graded Nanosystems with Achromatic Sub-Wavelength Architectures for Light Filtering and Advanced SERS Detection

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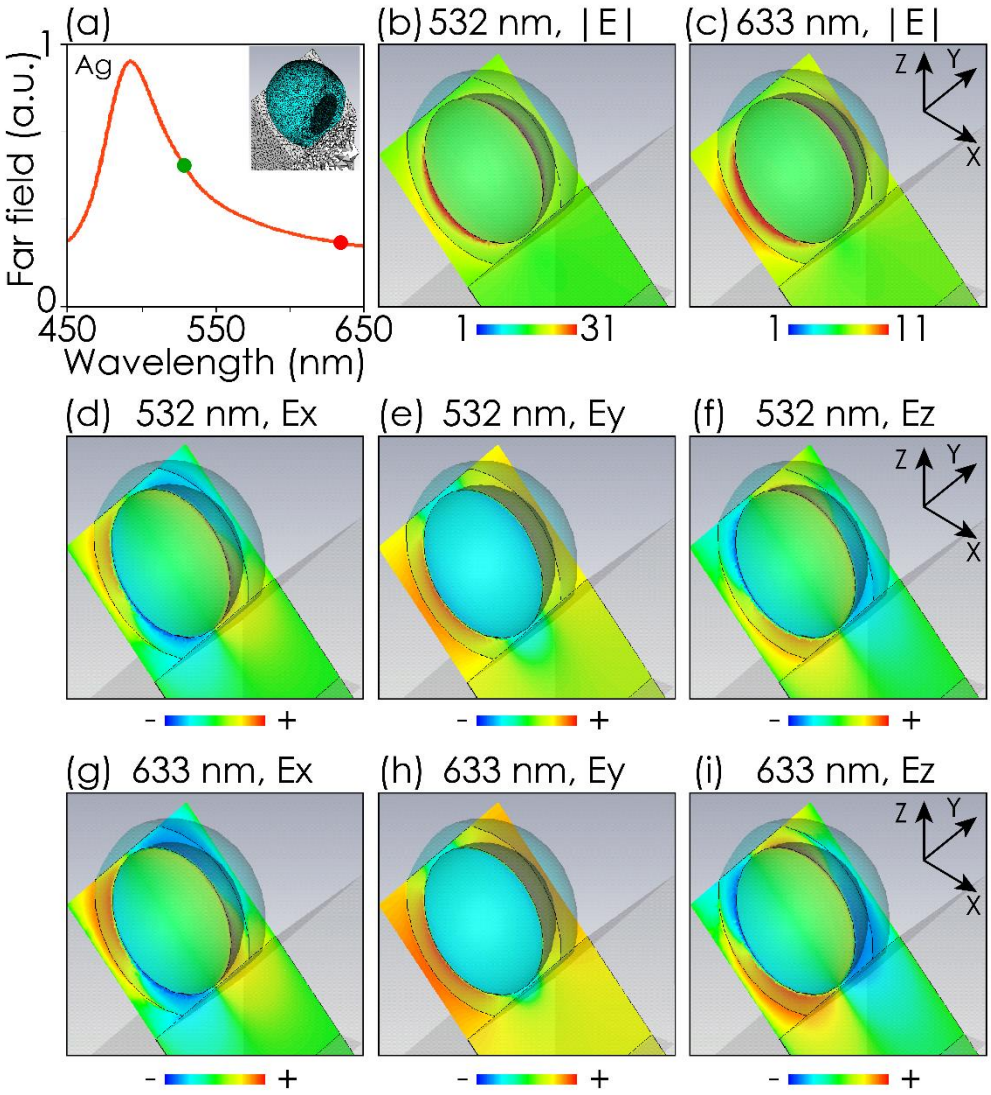

Figure S1: (a) Extinction spectra for Ag when a 3 nm layer of 4-mercaptobenzoic acid is deposited on the nanoparticles. The green (red) dot corresponds to 532 nm (633 nm). The inset shows the mesh resolution (mesh < 0.5 nm). (b-c) Electric field enhancements for the 532 nm excitation calculated immediately outside the 4MBA layer and the metallic nanoparticle, respectively. Both the directionality of the field and its strong decay are clearly visible. (d-f) components of the electric field at 532 nm. (g-i) components of the electric field at 633 nm

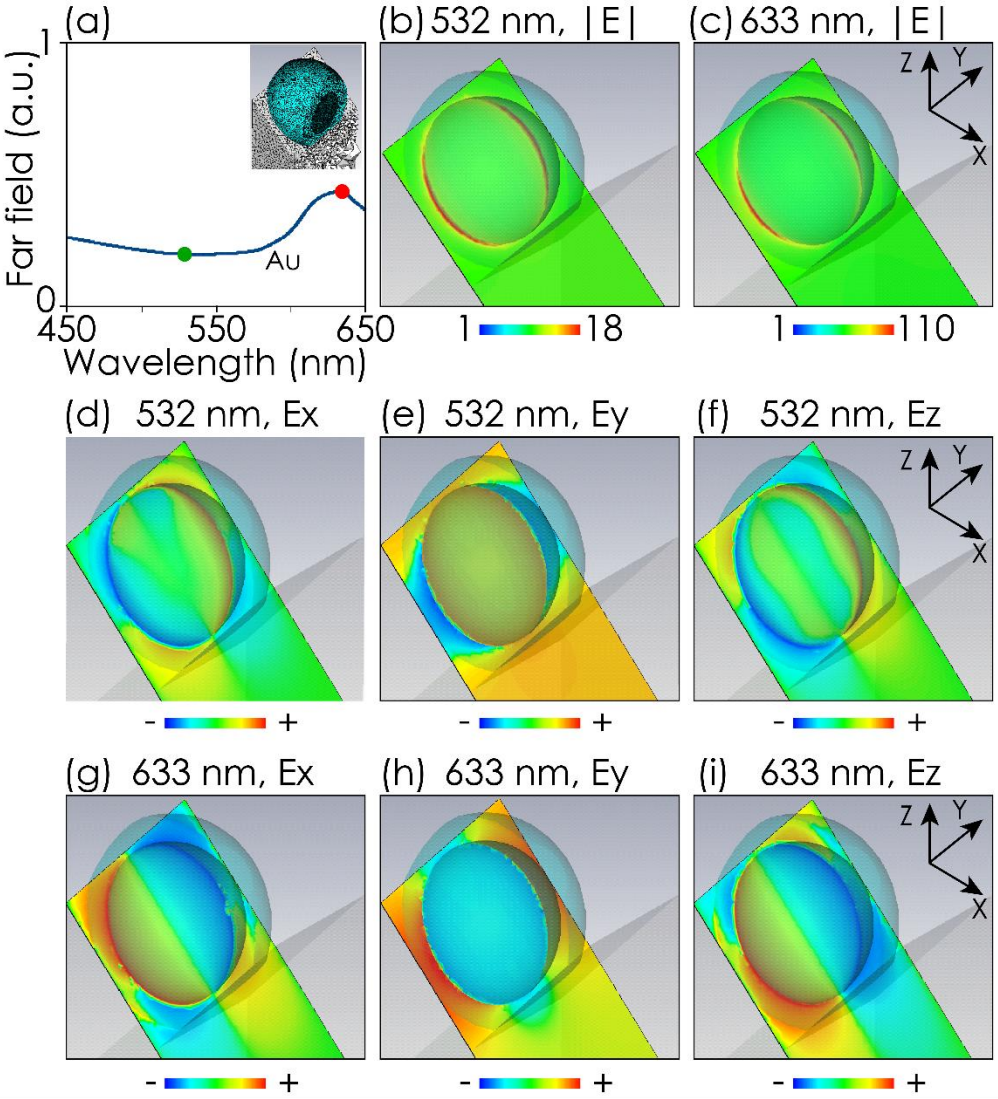

Figure S2: (a) Extinction spectra for Au when a 3 nm layer of 4-mercaptobenzoic acid is deposited on the nanoparticles. The green (red) dot corresponds to 532 nm (633 nm). The inset shows the mesh resolution (mesh < 0.5 nm). (b-c) Electric field enhancements for the 532 nm excitation calculated immediately outside the 4MBA layer and the metallic nanoparticle, respectively. Both the directionality of the field and its strong decay are clearly visible. (d-f) components of the electric field at 532 nm. (g-i) components of the electric field at 633 nm.

Au, Ag and $Au_{0.5}Ag_{0.5}$ permittivity:

Reference [35] was used for the definition of the permittivity of both Au and Ag, which are plotted in Figure 3a and 3b, respectively. Regarding $Au_{0.5}Ag_{0.5}$, its permittivity was characterized through ellipsometry and the results are shown in Figure 3c. The two dots represent the values of the permittivity at 532 nm and 633 nm.

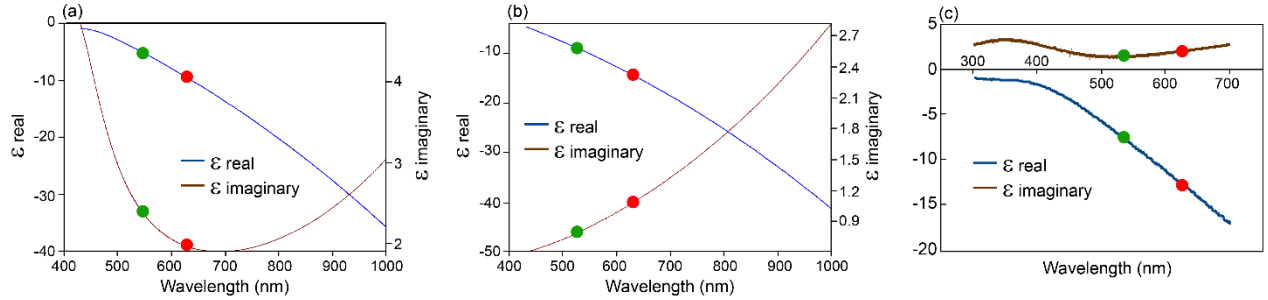

Figure S3: Real and imaginary parts of the permittivity ε for: (a) gold as described in [35]; (b) silver as described in [35]; (c) experimental values obtained through ellipsometry. The green and red dots highlight the 532 nm and 633 nm resonances, respectively.

Reflectivity spectra of naked and dressed nanoparticle arrays.

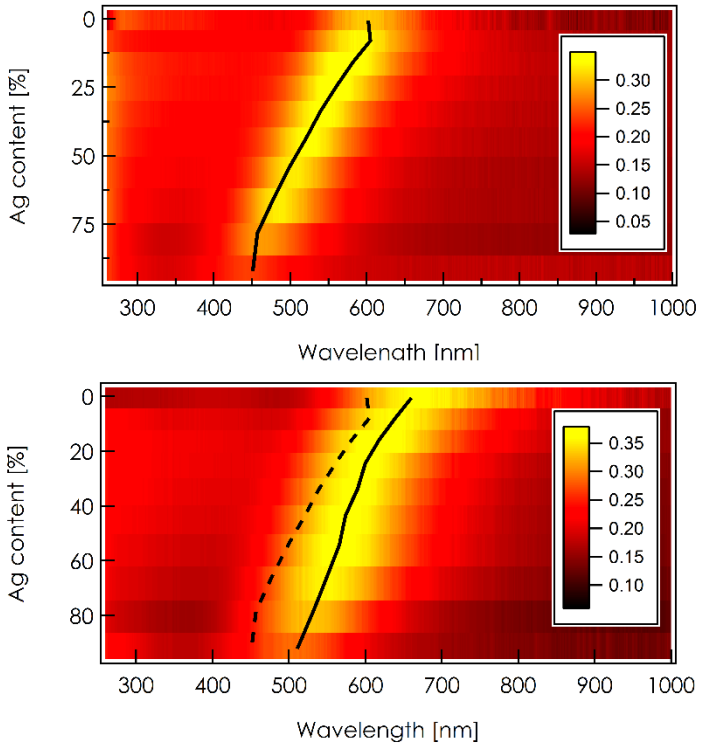

Figure S4: reflectivity maps of the alloy-NP arrays before (top) and after (bottom) the deposition of 4-mercaptobenzoic acid. The continuous black lines represent the reflectivity maxima, corresponding to the LSPR. The dashed black line in the bottom panel represents the reflectivity maxima for the naked particles, and is reported to highlight the LSPR redshift following the molecule deposition.