Supplementary Information

Large-Area Arrays of Epitaxially Aligned Silver Nanotriangles Seeded by Gold Nanostructures

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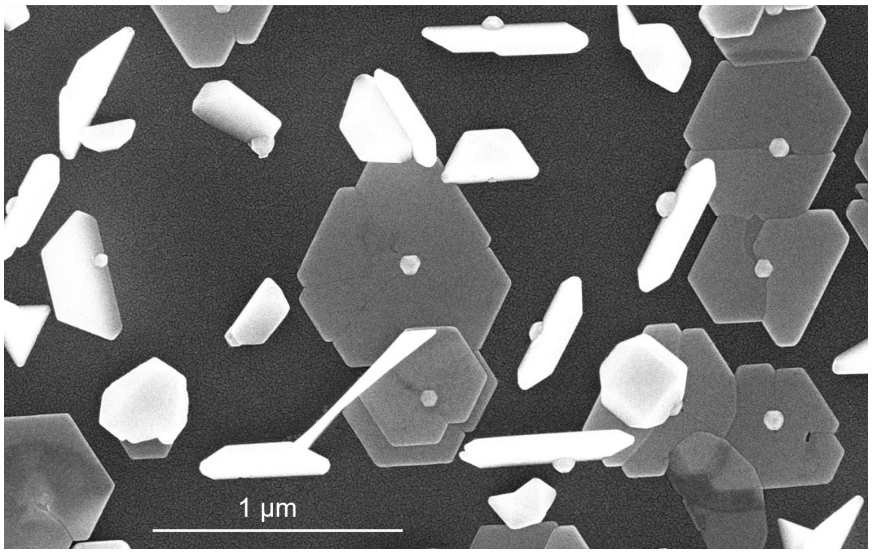

Figure S1. SEM image of Ag nanoplates derived from periodic arrays of Ag seeds. Ag seeds proved unsatisfactory in that they yielded a high percentage of structures with growth trajectories that are away from the surface of the substrate. When in-plane growth occurs, the seeds show a strong tendency toward three-dimensional growth such that the final product appears as a nanoplate from which a larger central structure protrudes.

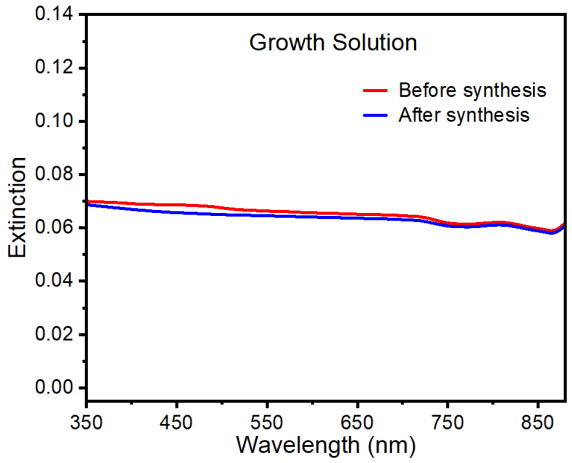

Figure S2. Extinction spectra of the growth solution taken before and after a substrate-based Ag nanotriangle synthesis. The fact that the two spectra overlap and appear featureless indicates that a measurable Ag colloid is unable to form over the 20 min duration of the synthesis.

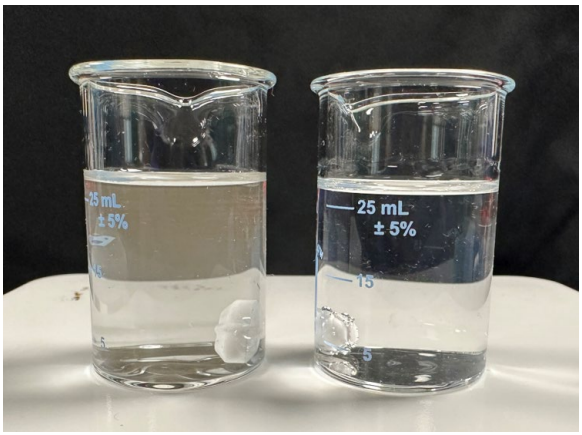

Figure S3. Image of the Ag nanoplate growth solution taken after a 20 min synthesis where acetonitrile is excluded from the synthesis (left) and included in the synthesis (right). The data confirms that acetonitrile is needed to suppress the homogeneous nucleation of Ag nanoparticles within the growth solution.

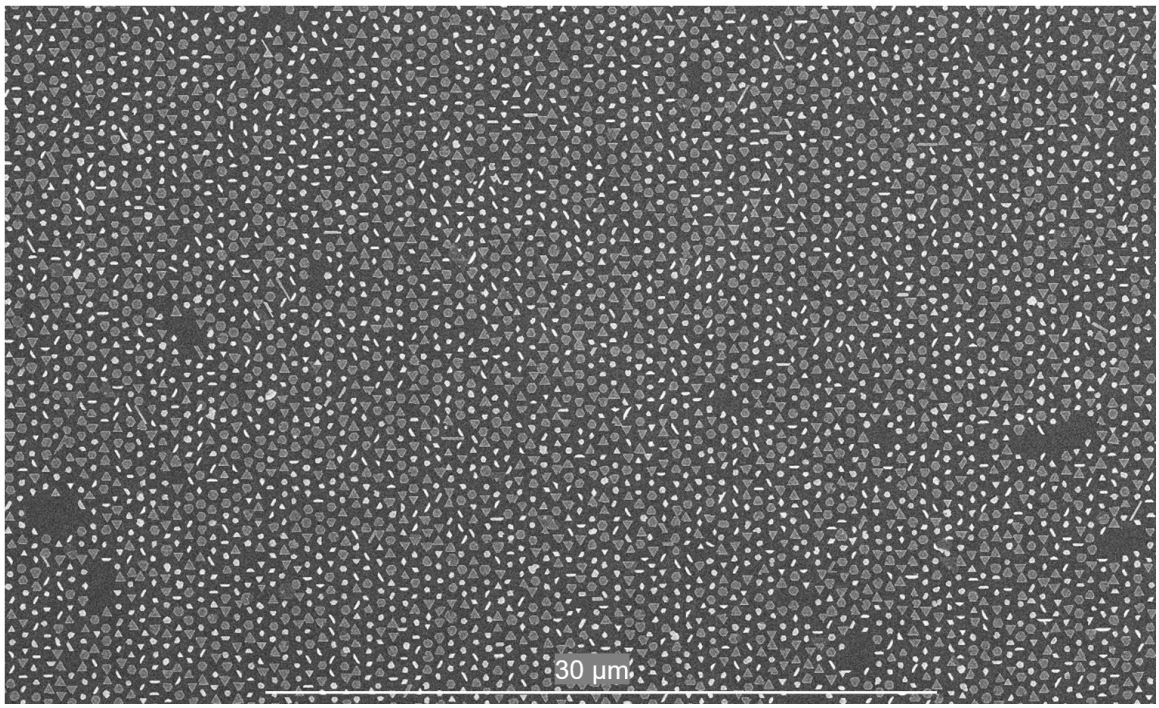

Figure S4. SEM image of the Ag nanoplate array taken at low magnification. It should be noted that array positions lacking structures are caused by damage to the nanoimprint lithography stamp.

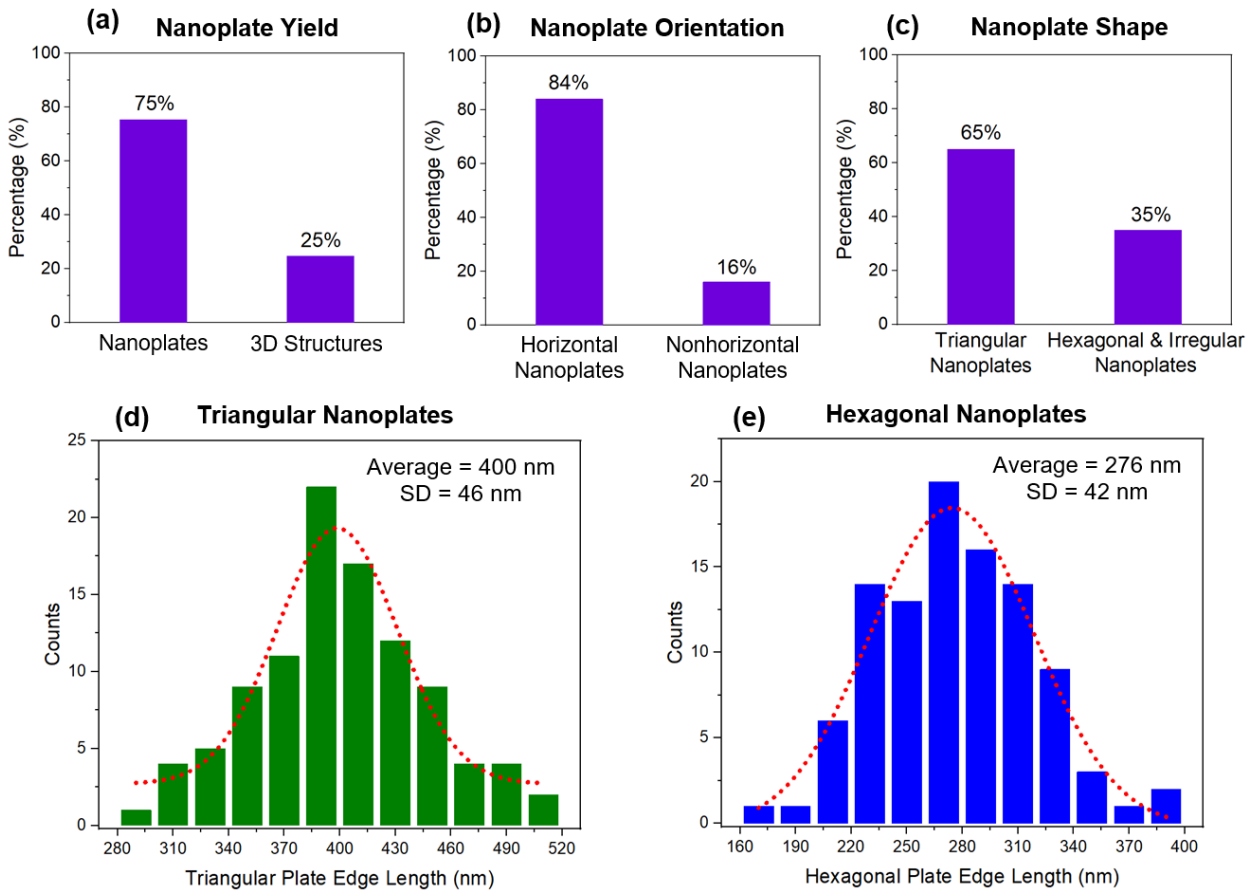

Figure S5. Histograms providing a statistical analysis of the reaction product based on an analysis of 1433 nanostructures that show (a) a nanoplate yield of 75% with the remainder of the structures expressing various three-dimensional morphologies, (b) that 84% of the nanoplates lie flat on the substrate with the remainder having a growth trajectory that is away from the substrate's surface, and (c) a nanotriangle yield of 65% with the remainder showing hexagonal or irregularly-shaped planar morphologies. Histograms providing a statistical analysis of the edge length distributions of (d) triangular and (e) the hexagonal nanoplates based on an analysis of 100 nanostructures. Also provided are average values with standard deviations (SD).

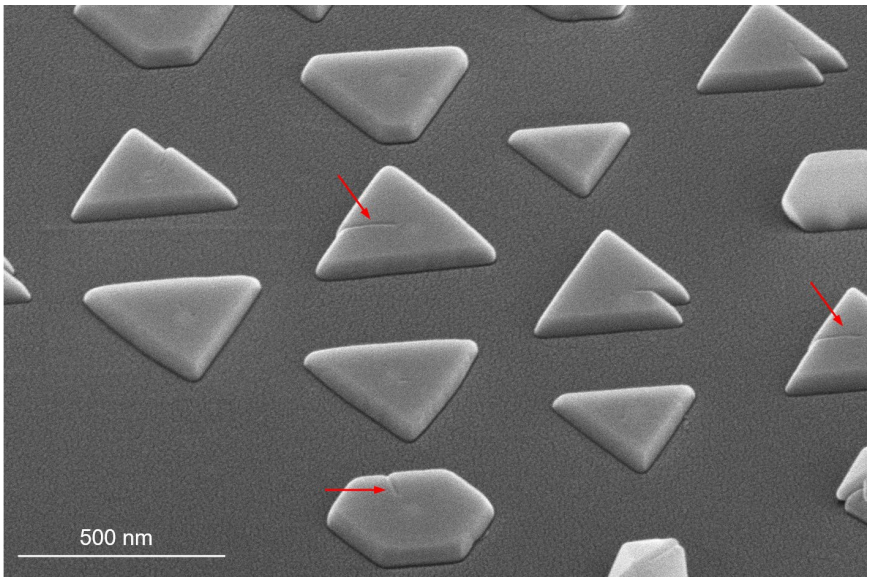

Figure S6. High-resolution SEM images showing the crack-like features exhibited by many of the Ag nanoplates.

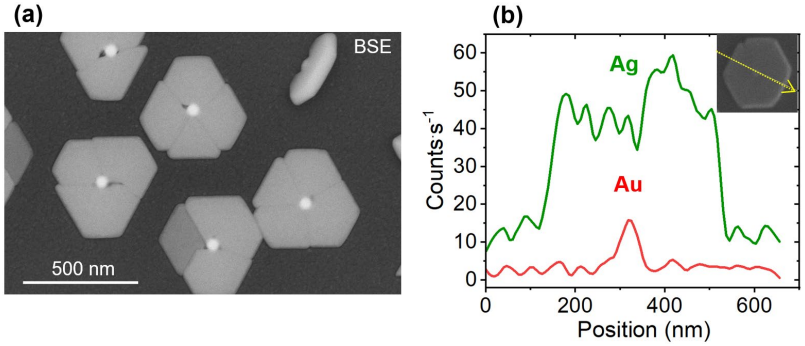

Figure S7. (a) BSE SEM image of hexagonal plates where Au seeds are clearly visible. (b) Line scan for a hexagonal plate showing a Au seed positioned in the middle of the Ag nanoplate.

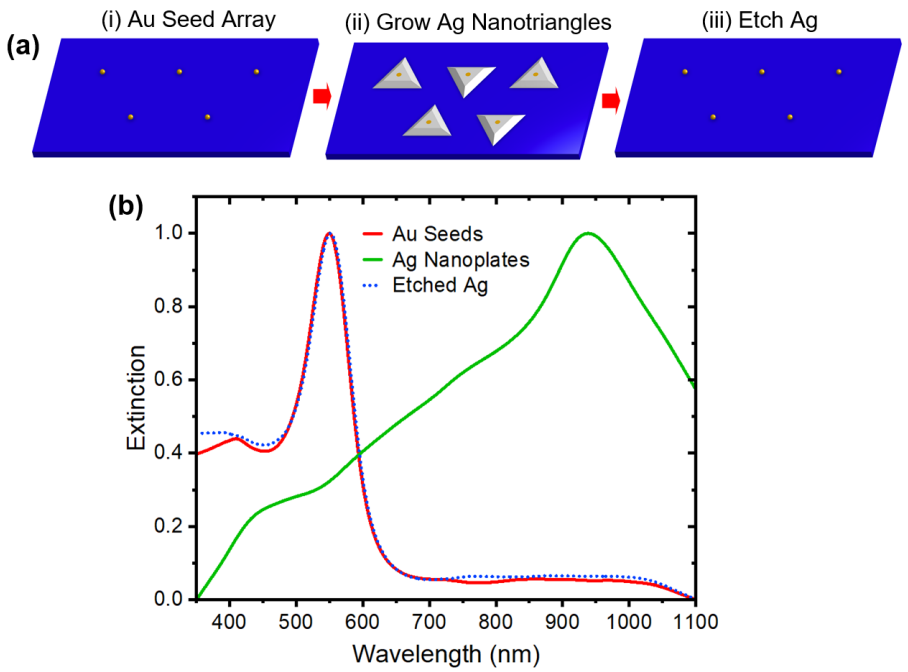

Figure S8. (a) Schematic and (b) the associated normalized extinction spectra taken for the same Au seed array (i) before being placed into the Ag nanotriangle growth solution, (ii) after the Ag nanoplate growth, and (iii) after the removal of the Ag with an etchant. The fact that the Au plasmon is near-identical for (i) and (iii) provides evidence that Au−Ag interdiffussion at the interface is minimal during the synthesis.

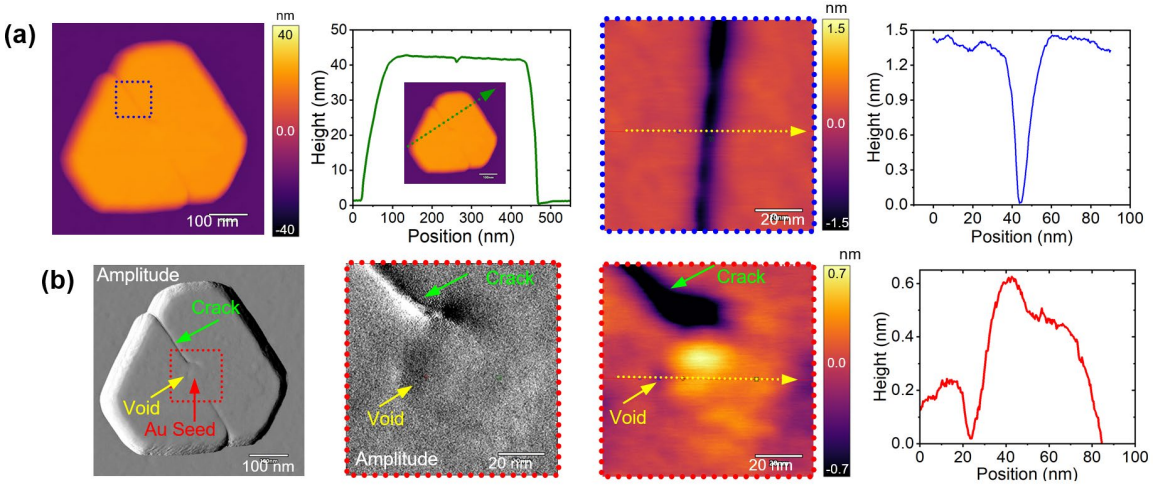

Figure S9. AFM characterization of a hexagonal nanoplate showing (a) crack- and (b) void-like features. It should be noted that the observed features are analogous to those observed for triangular nanoplates (Figure 5).

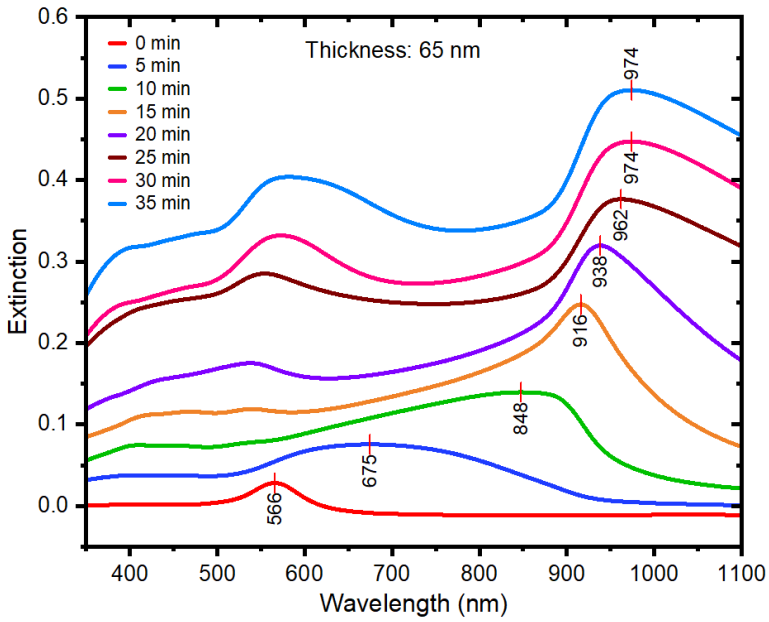

Figure S10. Time-dependent extinction spectra for a Ag nanotriangle synthesis that originates from Au seeds with a thickness of 65 nm.

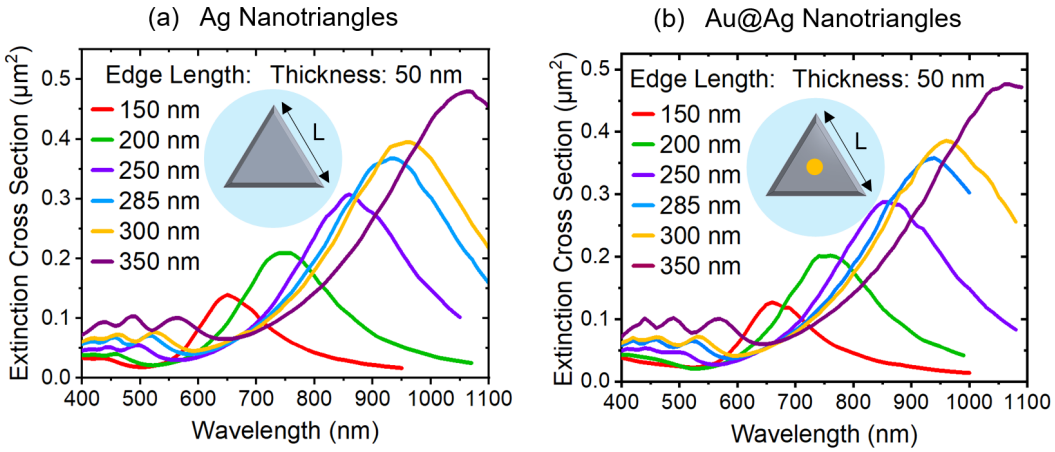

Figure S11. Simulations showing a comparison of the extinction spectra for (a) pure Ag nanotriangles and (b) Ag nanotriangles containing a centrally located Au seed (diameter = 75 nm) as the nanotriangle edge length is varied from 150 to 350 nm. It should be noted that the two structures show a near-identical response. Simulations include a 20 nm thick sapphire substrate.