Supporting Information

Formation of One-Dimensional Ag–Au Solid Solution Colloids with Au Nanorods as Seeds, Their Alloying Mechanisms, and Surface Plasmon Resonances

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Figure S1. (a) TEM image of the Au nanorods used as seeds. (b) UV–vis absorption spectrum of the Au nanorod seeds. The inset in panel b shows the photograph of the corresponding aqueous dispersion of the gold nanorods. The gold nanorods have ostensible round ends and an octagonal cross-section, and their side surfaces are bounded by a mix of both {100} and {110} facets.



Figure S2. (a) Large-area TEM image and (b) EDX spectrum of the AgAu alloy nanowires.



Figure S3. EDX spectrum of the Ag₃₃Au₆₇ nanorods.



Figure S4. Schematically illustrating how we calculated the geometrical volume of an Au or Ag₃₃Au₆₇ nanorod by assuming that both Au and Ag₃₃Au₆₇ nanorods have a same shape of octagaonal prism. The parameters, *l* and *d* indicate the side length and thickness of the nanorod. When $d_{Au nanorod} = 13.8$ nm, $l_{Au nanorod} = 41.7$ nm and $d_{Ag_{33}Au_{67} nanorod} = 16.3$ nm, $l_{Au nanorod} = 43.8$ nm, the $V_{Au nanorod}$ and $V_{Ag_{33}Au_{67} nanorod}$ are 5615.4 and 8228. 8 nm³, respectively, that is, the volumetric ratio of $V_{Ag_{33}Au_{67} nanorod}$ to $V_{Au nanorod}$ is 1.46 : 1.



Figure S5. TEM image of the elongated $Ag_{60}Au_{40}$ nanostructures synthesized at a concentration of AgCl six times higher than that used for the growth of the AgAu nanowires, while keeping the other conditions the same. The inset presents the photograph of the corresponding aqueous dispersion of the colloidal $Ag_{60}Au_{40}$ nanoparticles.



Figure S6. TEM image of Ag–Au nanostructures prepared by reducing AgCl by using Au nanoparticles instead of Au nanorods as seeds under otherwise the same conditions as those used for synthesizing the AgAu nanowires. The Au nanoparticles were those used as seeds for the preparation of the Au nanorods, as described in the Experimental Section.



Figure S7. TEM image of the Au@Ag Core/Shell nanorods prepared by reducing $AgNO_3$ in the presence of Au nanorods. All other experimental conditions conform with those for the preparation of the AgAu nanowires, as described in the main text.



Figure S8. HRTEM image of multiply twinned Ag nanoparticles prepared in the absence of Au nanorods under otherwise conditions identical to those used for the synthesis of the AgAu nanowires.



Figure S9. TEM image of dumbbell-shaped Ag/Au core/shell nanorods prepared in the absence of PVP while keeping the other conditions the same as those for the synthesis of the AgAu nanowires.