Electronic Supplementary Information for

Controlled Overgrowth of Pd on Au Nanorods

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Figure S1. (A) TEM and (B) SEM images of cylindrical Au nanorods.
**Figure S2.** TEM images (left panels) and SAED patterns (right panels) of (A) an individual Au@Pd core-shell nanorod with a polycrystalline Pd shell formed in CTAC and (B) an individual Au@Pd core-shell nanocuboid with a conformal single-crystalline Pd shell formed in CTAB.
Figure S3. TEM images of Au@Pd core-shell nanorods obtained at 5 min, 15 min, 30 min, 1 h, 2 h and 12 h during the Pd overgrowth on Au nanorods in the presence of CTAC at 30 °C. The molar ratio of AA to H₂PdCl₄ was 1.0. All the TEM images share the same scale bar in panel A.
Figure S4. TEM images of Au@Pd core-shell nanocuboids obtained at 30 min, 1 h, 2 h, 4 h, 8 h and 12 h during the Pd overgrowth on Au nanorods in the presence of CTAB at 30 °C. The molar ratio of AA to $\text{H}_2\text{PdCl}_4$ was 1.0. All the TEM images share the same scale bar in panel A.
Figure S5. EDS spectra of Au@Pd core-shell nanostructures obtained through Pd overgrowth in CTAC at 30 °C (A) in the absence of Ag⁺ and (B) in the presence of Ag⁺. The molar ratio of AA to H₂PdCl₄ was 0.5.
Figure S6. EDS spectra of Au@Pd core-shell nanostructures obtained through Pd overgrowth in CTAB at 30 °C (A) in the absence of Ag⁺ and (B) in the presence of Ag⁺. The molar ratio of AA to H₂PdCl₄ was 0.5.
Figure S7. TEM images of Au@Ag core-shell nanorods obtained after Ag UPD in (A) CTAC and (B) CTAB for 9 hours.
Figure S8. EDS spectra of (A) Au nanorods and Au@Ag core-shell nanorods after Ag UPD in (B) CTAC and (C) CTAB for 9 hours.
Figure S9. Optical extinction spectra of colloidal Au nanorods and Au@Ag core-shell nanorods obtained after Ag UPD in CTAC and CTAB for 9 hours.
Figure S10. TEM images of Au@Pd core-shell nanostructures synthesized with the addition of 400 µL of 1 mM Ag⁺, 300 µL of 10 mM H₂PdCl₄, and 30 µL of 50 mM AA into the solution of Au@Ag core-shell nanorods (pre-formed through Ag UPD on Au nanorods) in (A) CTAC and (B) CTAB.