

Electronic Supplementary Information

Dodecahedral Au@Pd Nanocrystals with High-Index Facets and Excellent Electrocatalytic Activity and Highly Efficient Surface-Enhanced Raman Scattering Enhancement

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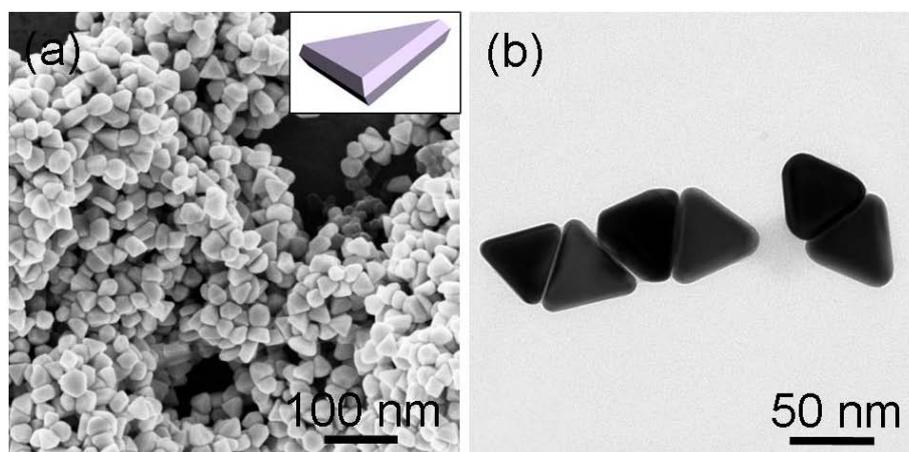
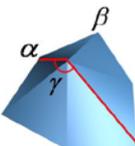


Figure S1. SEM and TEM images of 45-nm Au nanotriangles. The inset illustrates the corresponding model of Au nanocrystal.

Table S1. Theoretical projection angles and geometrical parameters of shield-like dodecahedral nanocrystals bounded by different high-index facets.

Geometrical model of polyhedron	Equation for the projection angle	Calculated projection angles			
		{hkl}	α	β	γ
	$\alpha = 2 \arctan\left(\frac{\sqrt{2}h}{k-l}\right)$ $\beta = 90 - \left(\frac{\alpha}{2}\right) + \left(\frac{\gamma}{2}\right)$ $\gamma = 2 \arctan\left(\frac{h+k}{\sqrt{2}l}\right)$	{321}	153.48°	87.47°	148.41°
		{431}	141.06°	98.05°	157.16°
		{541}	134.02°	104.06°	162.14°
		{542}	148.41°	88.35°	145.11°
		{651}	129.52°	107.92°	165.35°

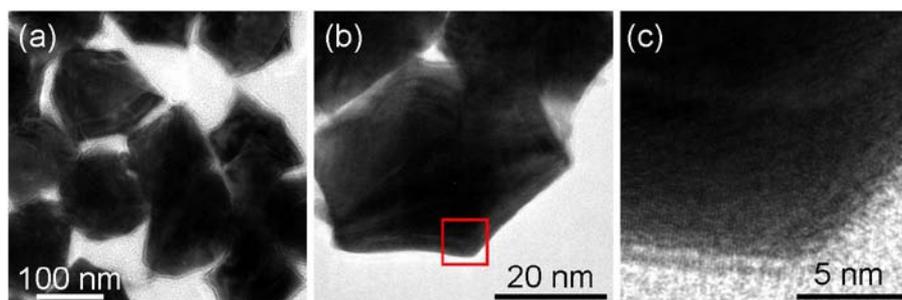


Figure S2. (a) Low- and (b) high-magnification TEM images of the shield-like Au@Pd nanocrystals. (c) HRTEM image taken from the region indicated with the red box in panel (b).

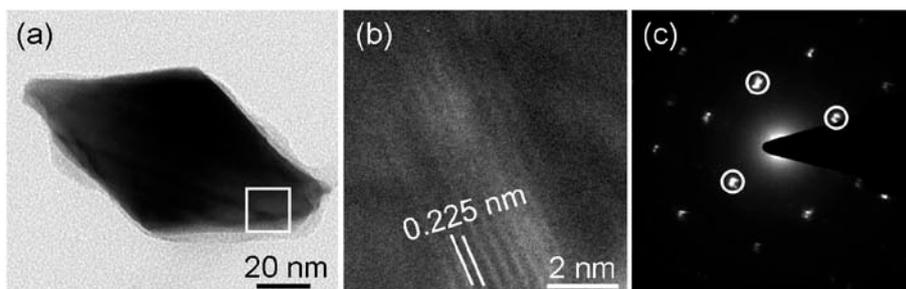


Figure S3. (a) TEM image of a shield-like Au@Pd nanocrystals viewed along the $\langle 110 \rangle$ direction. (b) HRTEM image of the square region marked in (a) showing the $\{111\}$ twin plane. (c) SEAD patterns of the twin plane.

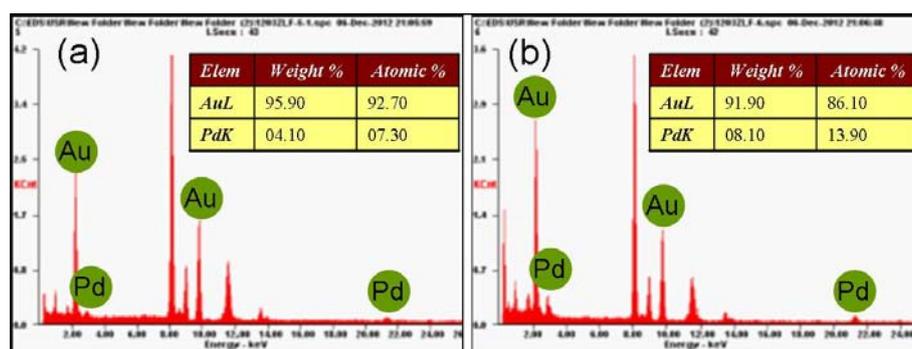


Figure S4. Energy-dispersive X-ray spectroscopy (EDS) spectrum of shield-shaped Au-Pd core-shell nanocrystals at different reaction time: 15 min (a) and 60 min (b).

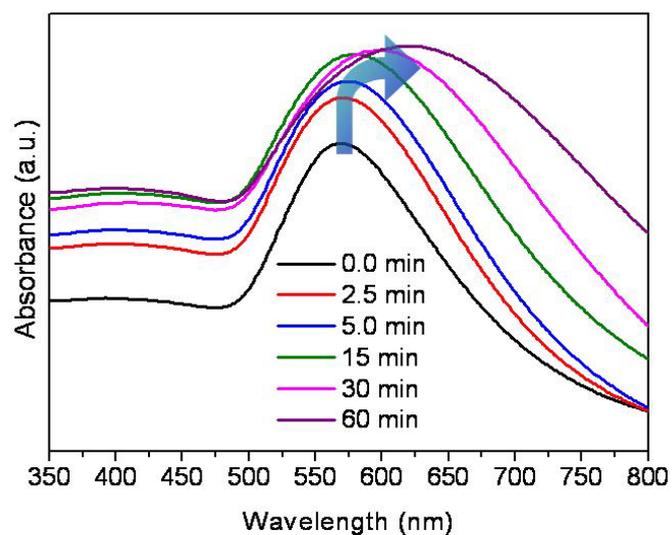


Figure S5. UV-vis spectra of the reaction solution obtained at different reaction time.

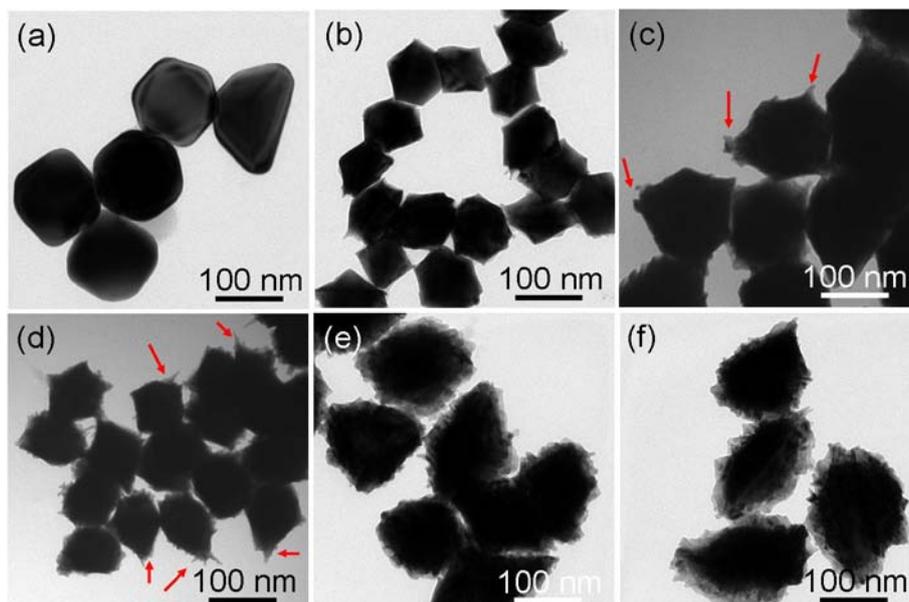


Figure S6. TEM images of core-shell nanocrystals prepared with the molar ratio of $\text{HAuCl}_4/\text{Na}_2\text{PdCl}_4$ of 1:0 (a), 4:1 (b), 3:2 (c), 2:3 (d), 1:4 (e), and 0:1 (f).

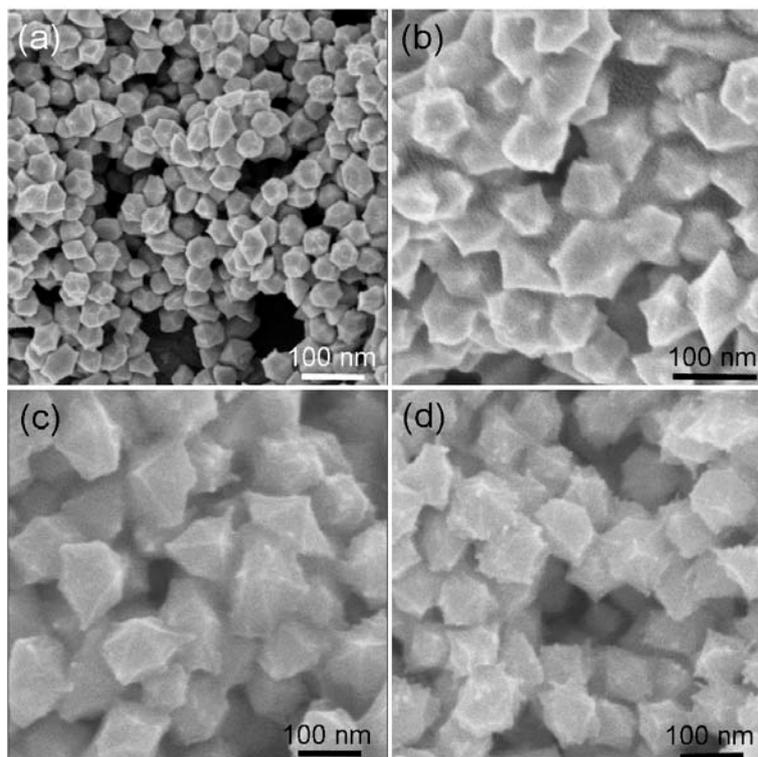


Figure S7. SEM images of nanocrystals prepared with different volumes of ascorbic acid (0.1 M): 0.15 mL (a), 0.25 mL (b), 0.35 mL (c), and 0.50 mL (d).

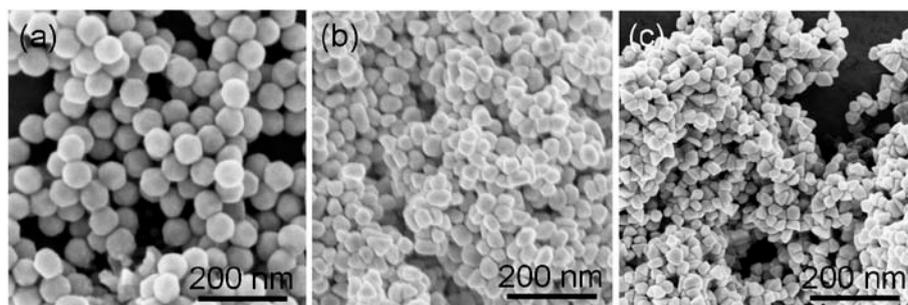


Figure S8. SEM images of Au seeds obtained by the addition of (a) DDAB, (b) CTAC, (c) DDAB + CTAC, respectively.

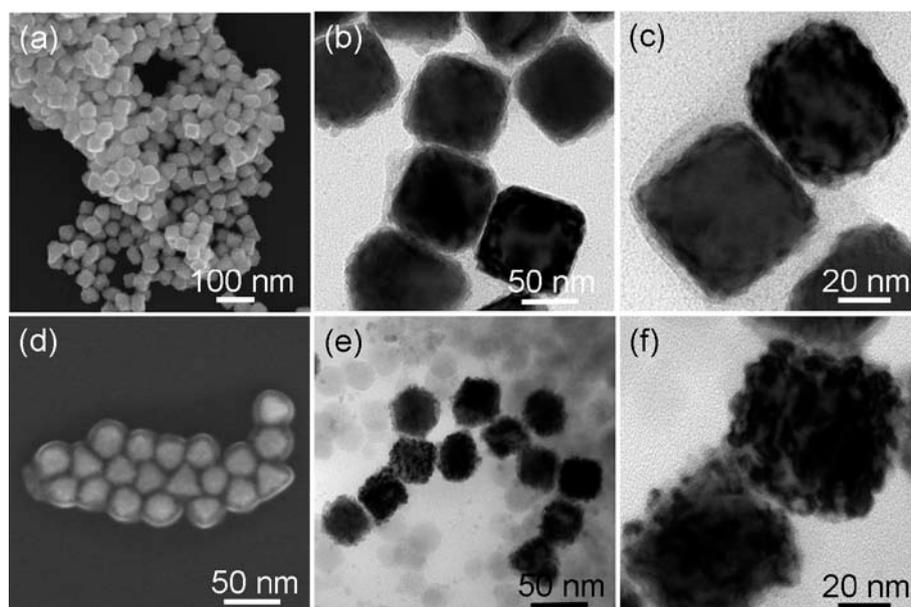


Figure S9. (a-c) SEM and TEM images of cubic Au@Pd core-shell nanocrystals. (d-f) SEM and TEM images of octahedral Au@Pd core-shell nanocrystals.