

Electronic supplementary information

Hygroscopy-Induced Nanoparticle Reshuffling in the Ionic-Gold-Residue-Stabilized Gold Suprananoparticles

Sungmoon Choi,[†] Minyoung Lim,[†] Yanlu Zhao, and Junhua Yu*

Department of Chemistry Education, Seoul National University, 1 Gwanak-Ro, Gwanak-Gu, Seoul 08826, South Korea

Address correspondence to junhua@snu.ac.kr

Experimental methods

Materials. 4-nitrophenol ($\geq 99\%$), sodium borohydride (powder, $\geq 98.0\%$), gold(III) chloride trihydrate, sodium chloride and poly(ethyleneimine) solution (average Mn $\sim 1,200$, 50 wt. % in H₂O) were purchased from Sigma-Aldrich and used without further purification. TEM grids (Carbon Grid Type-A, 300 Mesh, Cu) were purchased from TedPella.

Instruments. HRTEM images were obtained on a JEM 3010 high-resolution transmission electron microscope. Absorption spectra were obtained on a Sinco S-4100 with a kinetic model that enabled the time-resolved spectrum measurement. Zeta potentials and hydrodynamic radii were analyzed with a Zetasizer Nano 2000 (Malvern Instruments, USA).

UV-Visible spectroscopy. UV-visible spectra were obtained on SCINCO S-4100 Scan UV-visible spectrophotometer at the kinetic model, by which a full absorption spectrum was recorded at a 1200 ms interval. The kinetic data was obtained at the same time.

Preparation of stock solutions

Polyethyleneimine (PEI) (2.4 mM) was prepared in deionized water and kept in a refrigerator.

Sodium borohydride stock solution (1 mg/mL). Sodium borohydride (3 mg) was dissolved in DI water (3 mL).

4-nitrophenol stock solution (0.14 M). 120 mg of 4-nitrophenol was dissolved in DI water (6 mL).

E-mail: junhua@snu.ac.kr

[†] These authors contributed equally to this work.

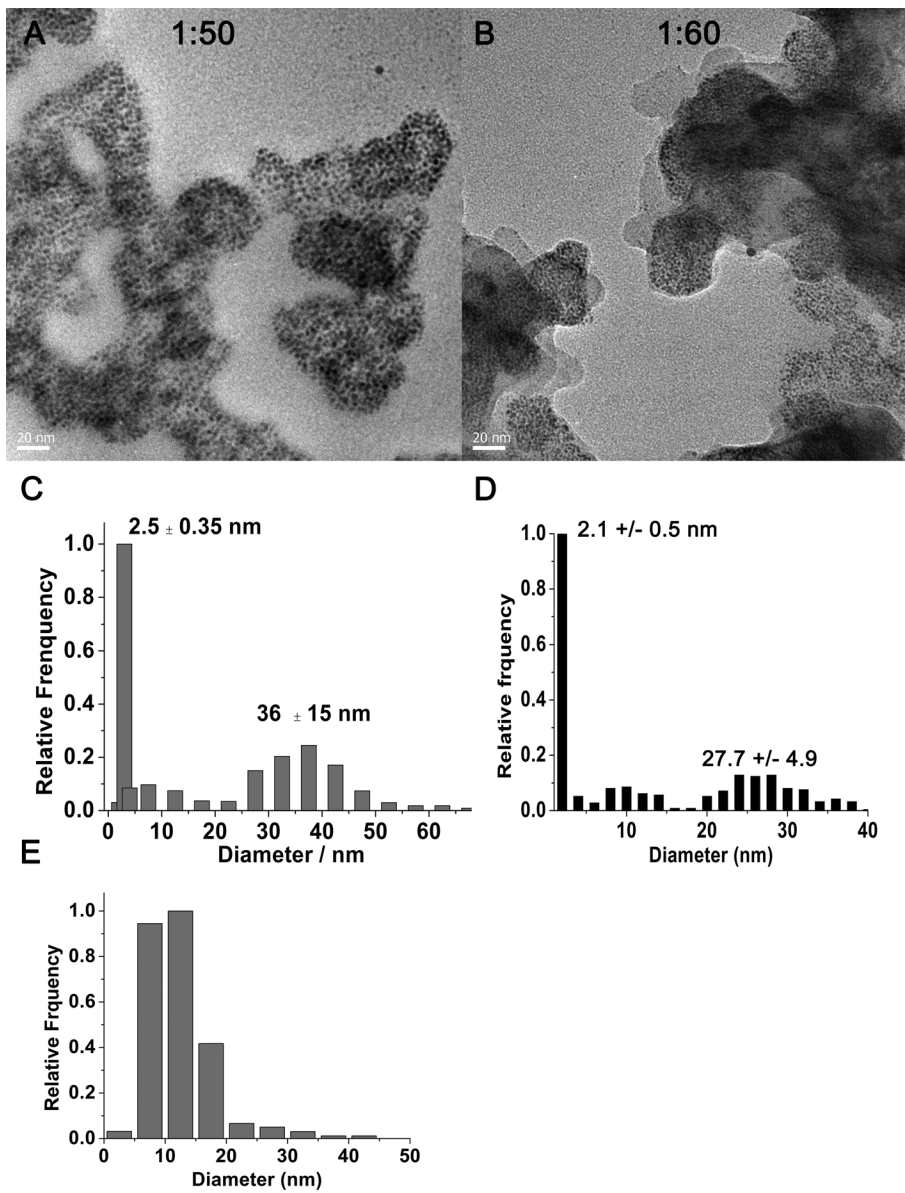


Fig. S1 TEM images and size distribution of gold nanoparticles at a PEI/Au(III) molar ratio of 1:50 (A, C) and 1:60 (B, D). Scale bar: 20 nm. E, Size distribution of PEI/Au(III) molar ratio of 1:1.4.

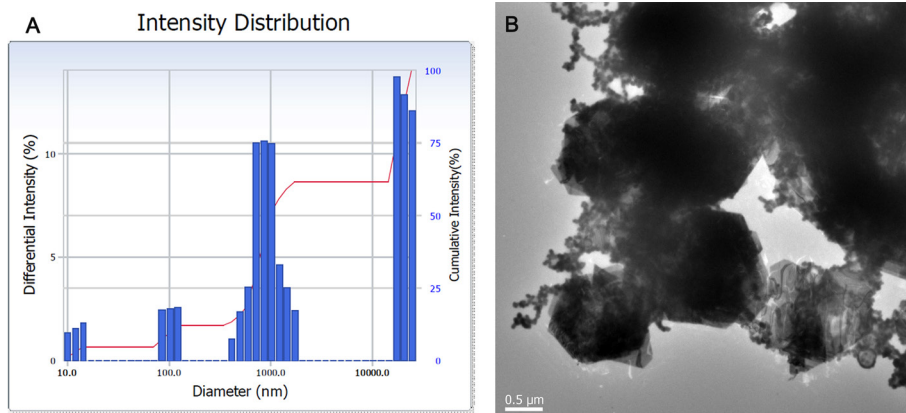


Fig. S2 Hydrodynamic radii of the gold nanoparticles prepared at a PEI/Au(III) molar ratio of 1:40. A, DLS measurement of the nanoparticles. B, TEM image shows the aggregates of the suprananoparticles and the large gold plates.

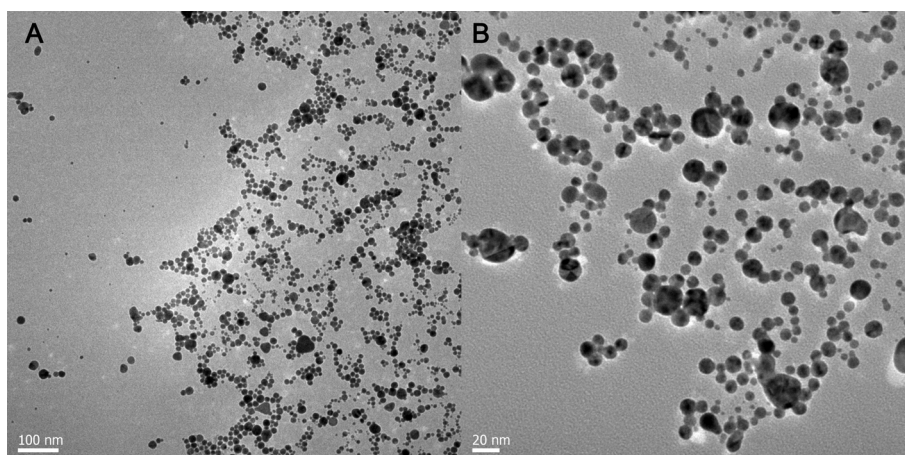


Fig. S3 TEM images of the lyophilized gold nanoparticles (PEI/Au(III) molar ratio of 1:40) in black. Scale bar: 100 nm (A) and 20 nm (B).