Supporting Information

Simple-cubic microcubes assembled by palladium nanocubes

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Experimental details:

Materials. Palladium nitrate dihydrate ($PdNO_3 \cdot 2H_2O$), sodium ascorbate (99%), ethylene glycol (EG, A.R.) and cetyltrimethylammonium bromide (CTAB, 99%) were obtained from Sinopharm Chemical Reagent Co. Ltd. All the chemicals were introduced as purchased without further purification. All aqueous solutions of $PdNO_3$, CTAB, and sodium ascorbate were freshly prepared before use.

Synthesis of Pd Nanocubes. CTAB (0.1820 g) and sodium ascorbate (0.0099 g) were dissolved in 15 mL of deionized water in a 50-mL vial. The vial was put in a 50 ^{o}C water bath under magnetic stirring. $PdNO_3 \cdot 2H_2O$ (0.0108 g) was dissolved in 5 mL of deionized water and the solution was rapidly added into the vial. Allow the mixed solution to react for 30 min at 50 ^{o}C under magnetic stirring. Then the product was collected by centrifugation.

Self-assembly of Pd Nanocubes. 1 mL of the reaction mixture was centrifuged at 16000 rpm for 15 min. The supernatant solution was discarded. Then, the solid residue was re-dispersed in 50 μL of 25 mM aqueous CTAB solution at 50 ^{o}C by sonication. The concentration of Pd nanocubes was about 2×10^{13} mL^{-1}. 25 μL of this solution was dropped on a silicon wafer (4×4 mm^2), which was put at the bottom of a 5 mL vial in advance. The vial was capped with a coverslip and kept at 25 ^{o}C for about 12 h to completely evaporate the solvent. Finally, the residual CTAB on the silicon wafer was removed by immersing the substrate in 5 ml of ethanol before the sample was characterized by scanning electron microscopy (SEM) and optical microscopy.

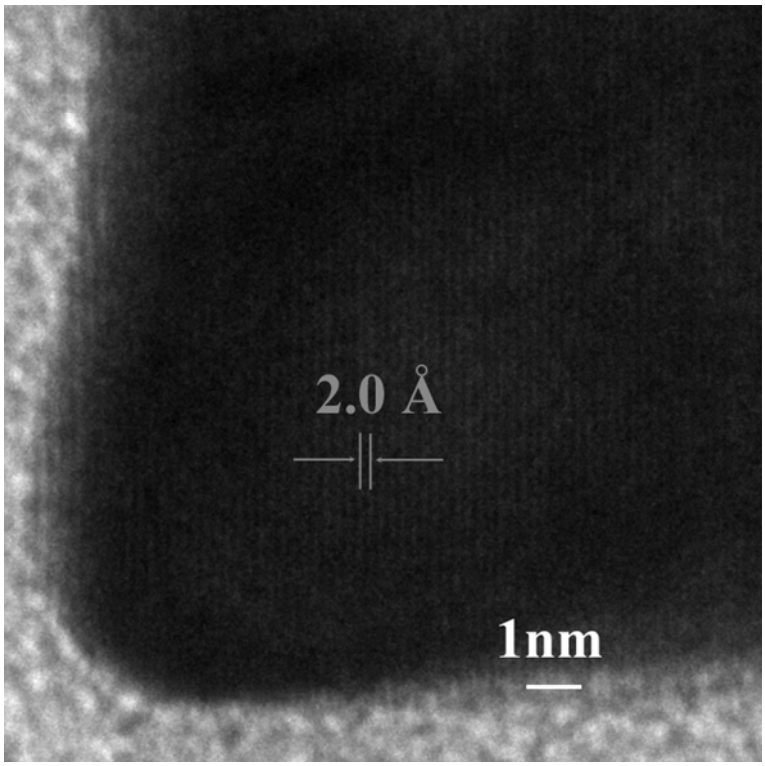

Fig. S1. HRTEM image of one of the corners of a Pd nanocube along the [100] zone axis.

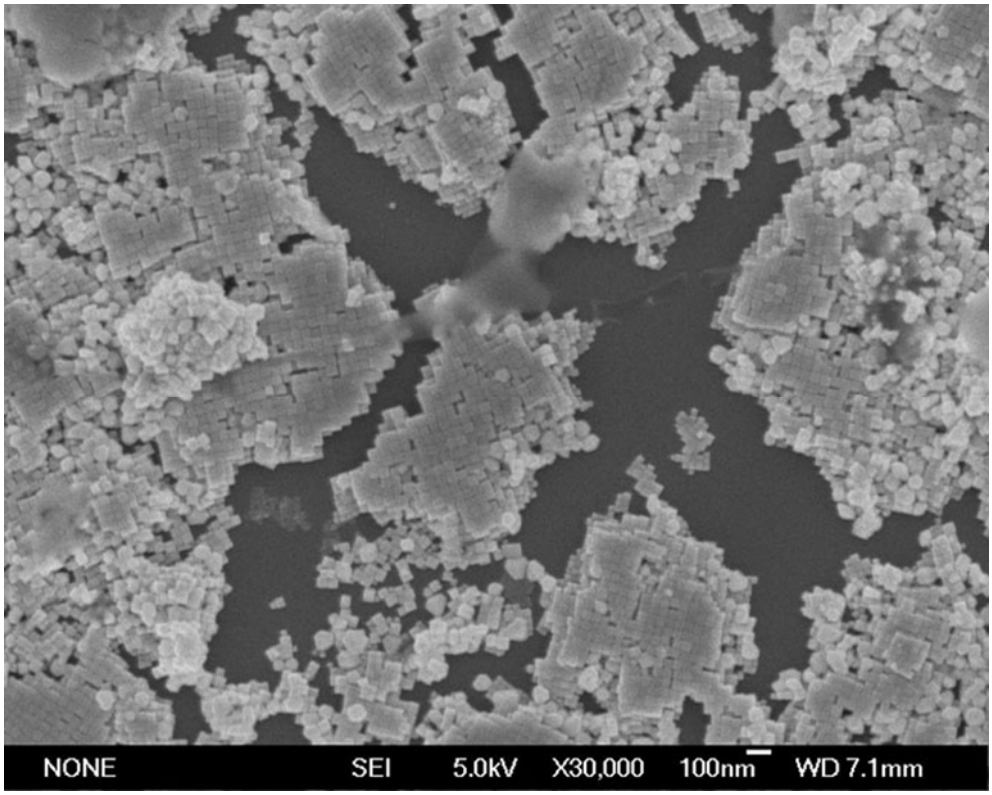

Fig. S2. SEM image of the sample prepared at 50 ^{o}C. Quasi 2D square arrays with a few haphazard aggregates are obtained.

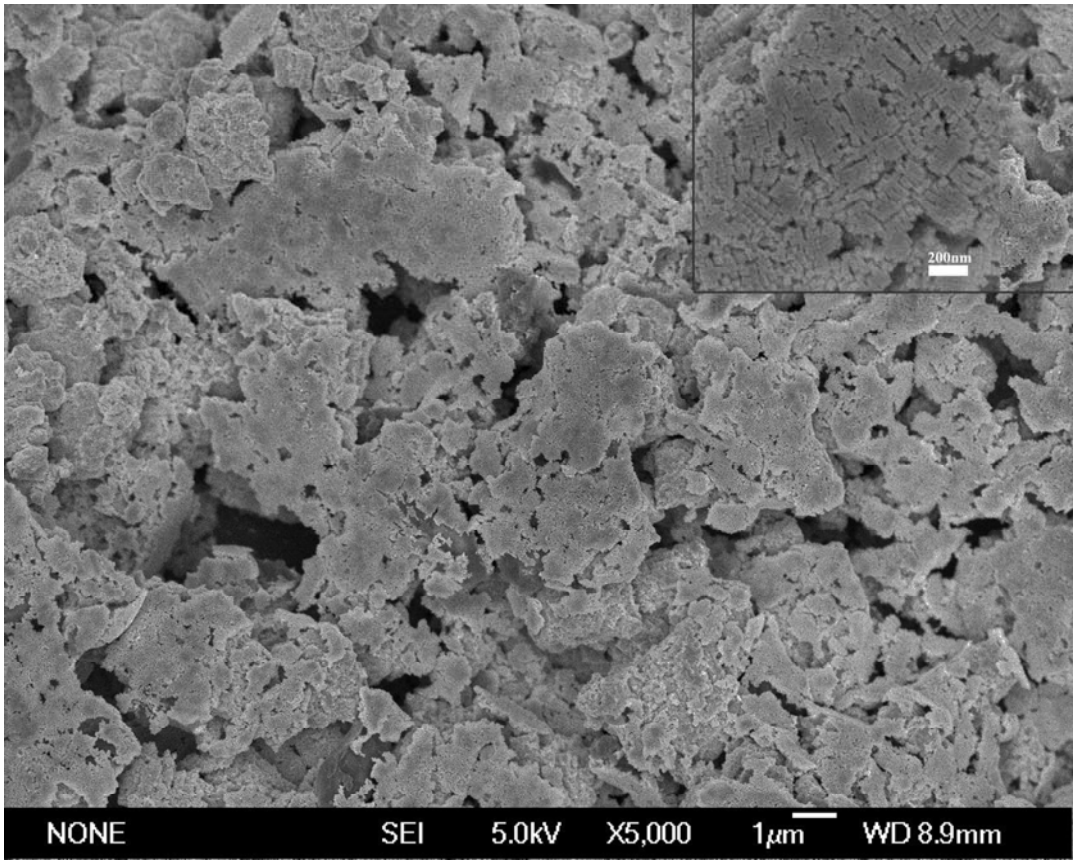

Fig. S3. SEM image of the sample prepared with 100 mM CTAB.