Electronic Supplementary Information for Dalton Transactions

Supplementary Information

Single-crystal Pt nanorods with tunable length fabricated by a simple glycol-assisted vacuum impregnation method

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1. Synthesis

The mesoporous silica SBA-15 was synthesized according to the procedures reported earlier.[1] Briefly, a solution of P123 : HCl : TEOS : H_2O = 2: 15 : 3.6 : 60 (mass ratio) was prepared, stirred for 24 h at 40 °C, and then heated at 100 °C for 2 days. The products were washed, dried and calcined at 550 °C for 6 h to remove the template. This was the starting material.

In a typical preparation of Pt nanorods incorporation of the SBA-15, 0.5 g of the template-free SBA-15 was dehydrated at 383 K for about 4 h in a homemade vacuum apparatus. After cooling down to room temperature, it was immersed into 2.5ml mixture of glycol, water, and $H_2PtCl_6.6H_2O$ (1.25 ml glycol, 1.25 ml water, 53 mg $H_2PtCl_6.6H_2O$). The resulting sample (SBA-15 / H_2PtCl_6 / water / glycol) was quickly transfered into the oven at 413 K and hold for 30 min, then washed and dried at 373 K to get the SBA-15 hosted Pt nanorods (4 wt%). When the concentration of the $H_2PtCl_6.6H_2O$ in the mixture solution was changed, we can get Pt nanorods/SBA-15 with different weight loadings, for instance: 2% (26.5 mg), 8% (106 mg), 16% (212 mg). Pt nanoparticles/SBA-15 (4 wt%) was prepared with the similar method, except adding 0.5g glucose in the mixture of glycol, water, and $H_2PtCl_6.6H_2O$ (1.25 ml glycol, 1.25 ml water, 53mg $H_2PtCl_6.6H_2O$). To extract nanorods from

SBA-15, aqueous HF (46 wt %) was diluted to 5.0 wt % with ethanol, and to this solution was added the powder sample. After a few minutes without stirring, the solution turned pale gray, and black Pt nanorods were precipitated. The unsupported Pt nanorods were separated on a filter paper, washed with ethanol, and dried in air.

2. Characterization

The N_2 adsorption–desorption isotherms were recorded on an ASAP 2000 instrument. TEM images were obtained on a Tecnai G^2 Spirit FEI Transmission Electron Microscope operating at 120 kv. The HRTEM images were obtained with Tecnai G^2 F30 S-Twin Transmission Electron Microscope, operating at 300 kv. XRD patterns were collected on a Rigaku D/MAX 2400 diffractometer equipped with a CuKa X-ray source.

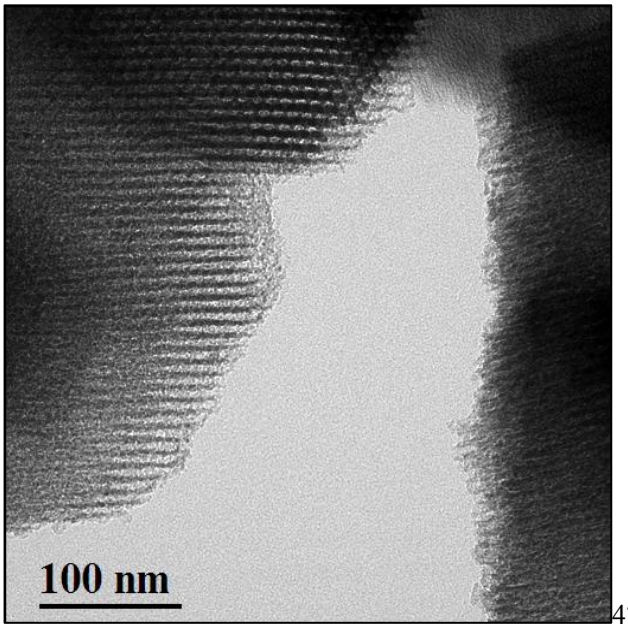

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Figure S1 TEM images of parent SBA-15 with the diameter of around 7 nm.

Table S1. Physical properties of selected samples

Sample	S_{BET}/m^2g^{-1}	V_t/cm^3g^{-1}	D_{BJH}/nm	Length of rods/nm
SBA-15	711	0.92	5.62	
Pt/SBA-15 (4 wt%)	582	0.78	5.57	25-45

S_{BET}, BET specific surface area; V_t, total pore volume; D_{BJH}, pore diameter calculated using BJH method; the length of rods determined by TEM.

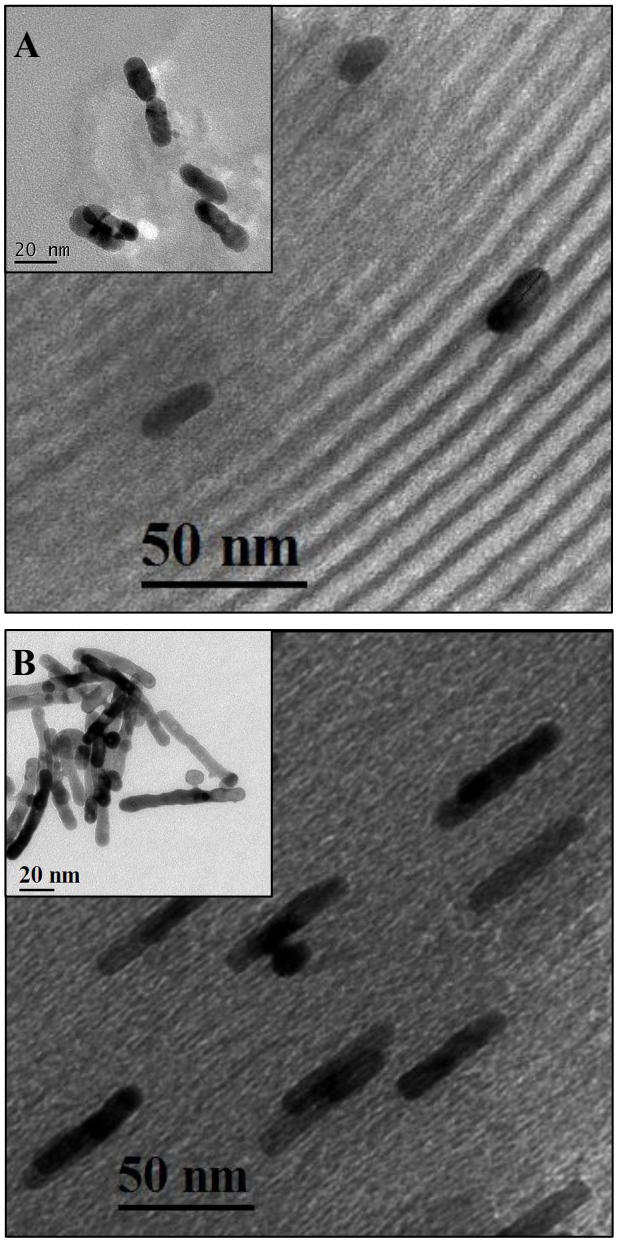

Figure S2. Magnification of the TEM images of the SBA-15 hosted pt nanorods with different lengths: A 15-25 nm (2 wt%), B 50-80 nm (8 wt%) and inserts are unsupported Pt nanorods extracted from SBA-15 matrix.

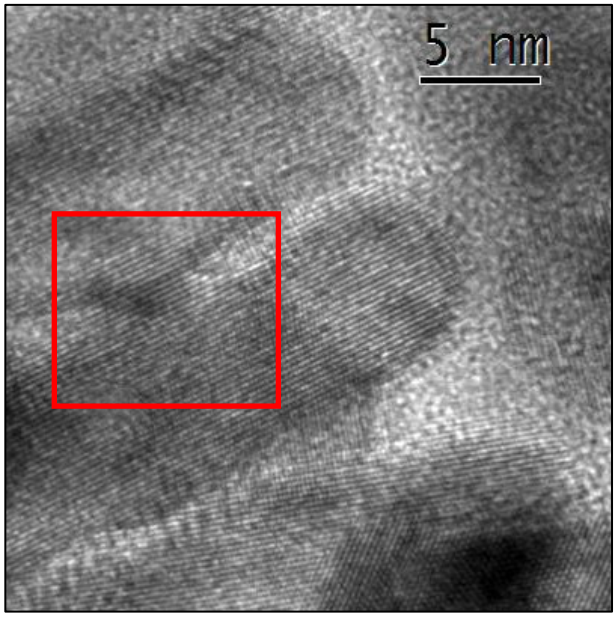

Figure S3. HRTEM image of the Pt nanorods bundles extracted from SBA-15 matrix and the interconnected bridge of two pt nanorods marked in the panel.

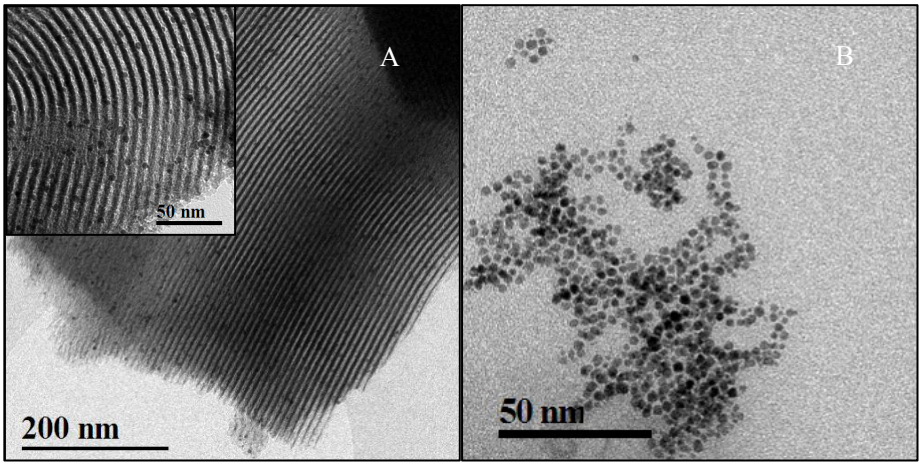

Figure S4. TEM images of the Pt nanoparticles incorporation into the SBA-15 (A) (4 wt%) and unsupported Pt nanoparticles after removing the SBA-15 matrix (B). Insert is the magnification.

Reference

1 D. Zhao, J. Feng, Q. Huo, B. F. Chmelka and G. D. Stucky, *Science*, 1998, **279**, 548