Electronic Supplementary Material (ESI) for Nanoscale.

Electronic Supplementary Information for

H_2-induced coalescence of Pt nanoparticles for the preparation of ultrathin Pt nanowires with high-density planar defects

Yaming Liu, Chaoqi Wang, Weicong Wang, Ruiyun Guo, Wei Bi, Yanjun Guo and Mingshang Jin*

Frontier Institute of Science and Technology and State Key Laboratory of Multiphase Flow in Power Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi 710049, China.

E-mail: jinm@mail.xjtu.edu.cn

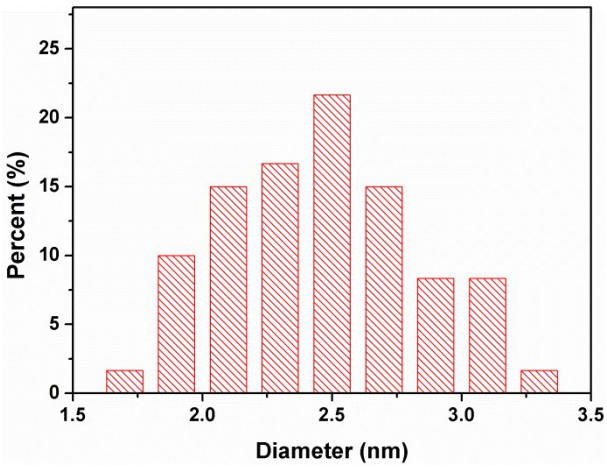

Figure S1 Diameter distribution of the ultrathin Pt nanowires.

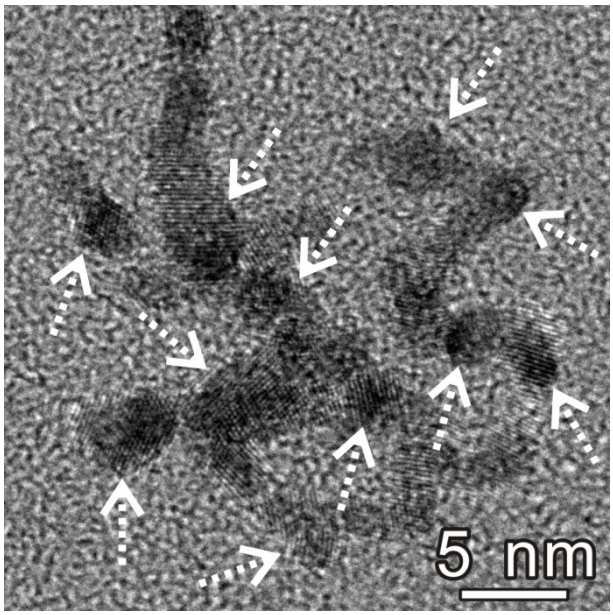

Figure S2 The high-magnification TEM image of the ultrathin Pt nanowires. White arrows indicate multiple crystalline domains.

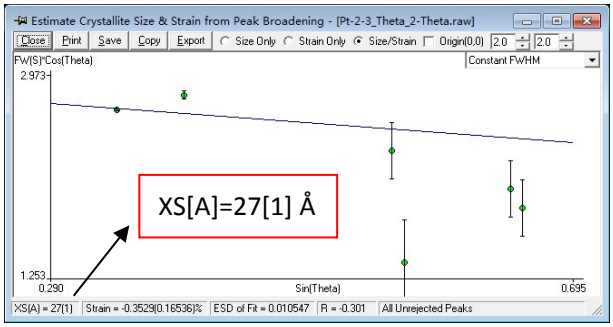

Figure S3 Particle size of ultrathin Pt nanowires calculated based on Scherrer's equation.

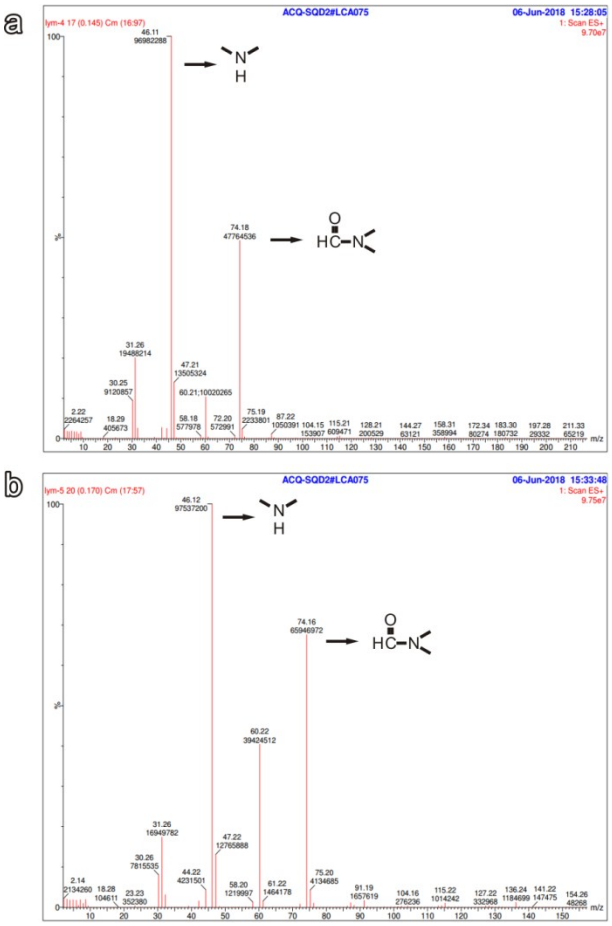

Figure S4 MS analysis of the liquid products by treating different solvents at 160 °C for 10 h: (a) A mixture of 2 mL DMF and 3 mL H_2O, and (b) pure DMF.

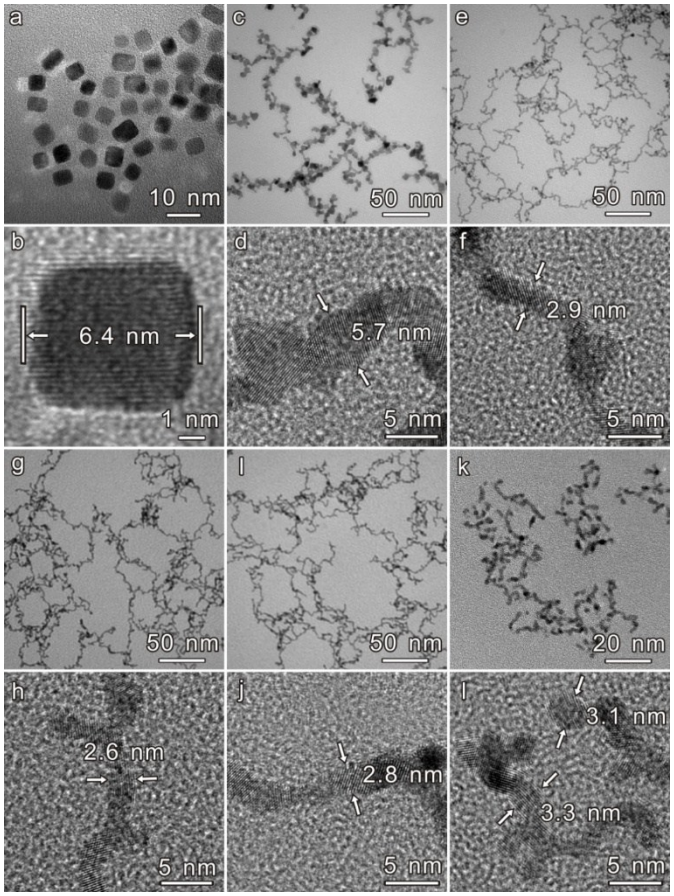

Figure S5 TEM (a, c, e, g, i, k) and HRTEM images (b, d, f, h, j, l) of Pt nanocrystals obtained under a standard condition except different ratios of DMF/H_2O. (a, b) 5∶0, (c, d) 4∶1, (e, f) 3∶2, (g, h) 2∶3, (i, j) 1∶4, (k, l) 1∶9.

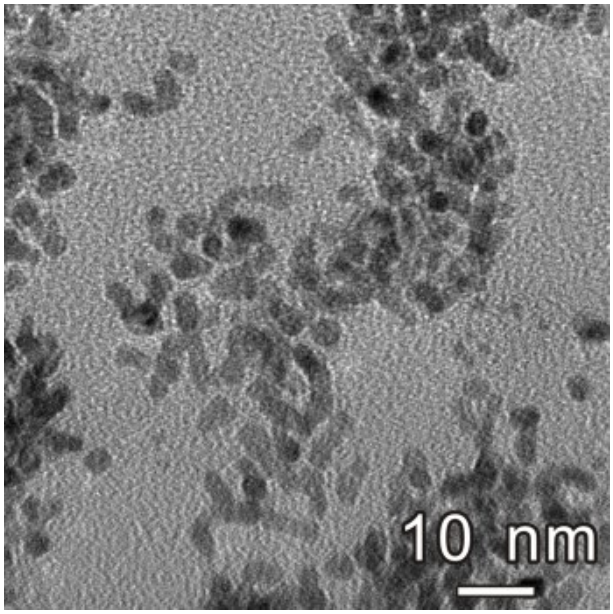

Figure S6 TEM of Pt nanocrystals obtained in pure DMF solution while H_2 was further added into the reaction system to induce the coalescence of Pt nanoparticles.

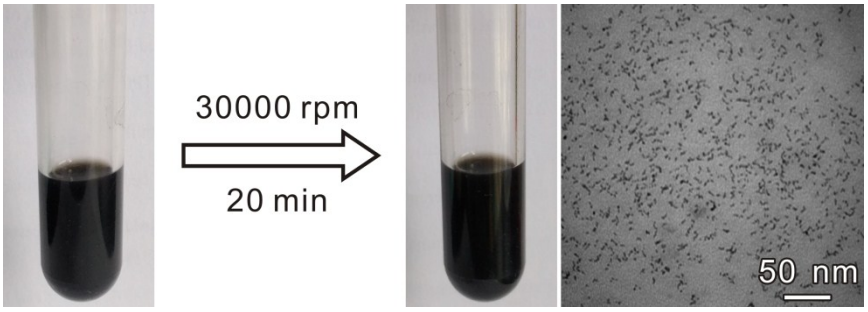

Figure S7 The products obtained in pure water (DMF/H_2O is 0∶5).

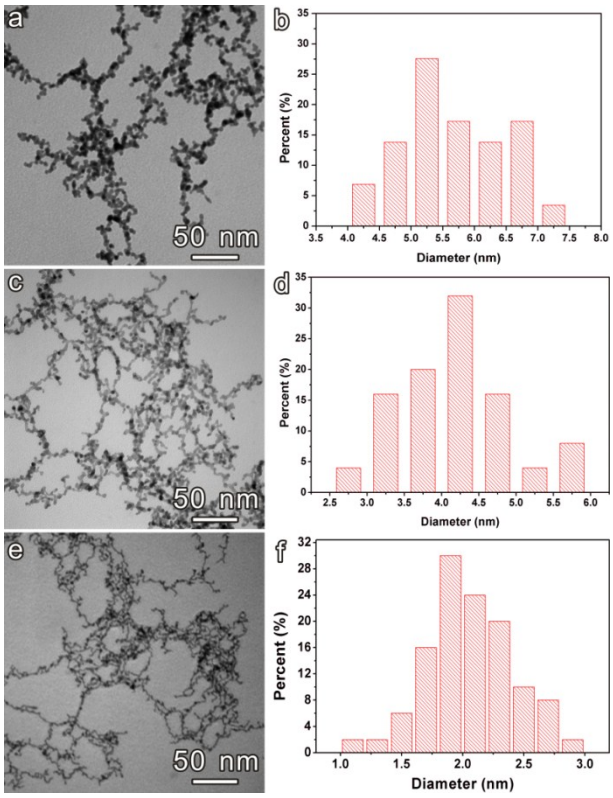

Figure S8 TEM images and diameter distributions of Pt nanowires obtained at a standard condition except different amount of thiophene. (a and b) 0 μL/mL, (c and d) 0.5 μL/mL, and (e and f) 20 μL/mL.

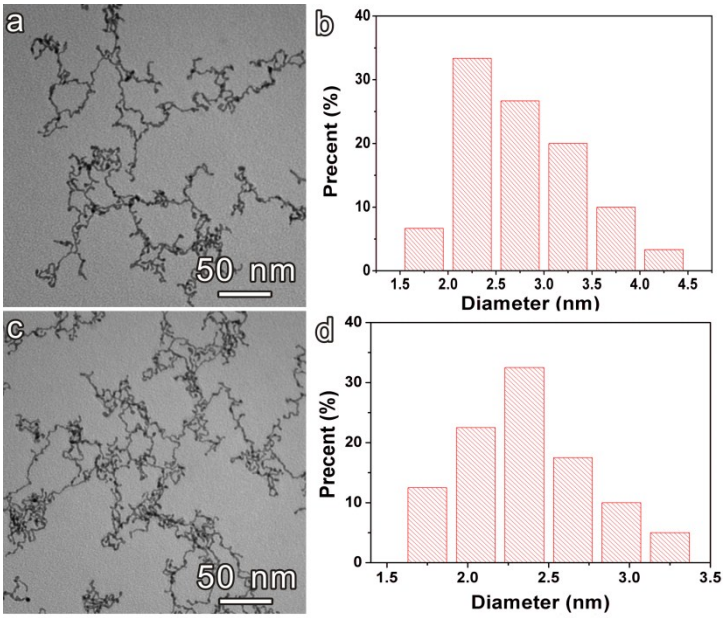

Figure S9 TEM images and diameter distributions of Pt nanowires obtained at different temperature. (a, b) 140 °C, (c d) 180 °C.

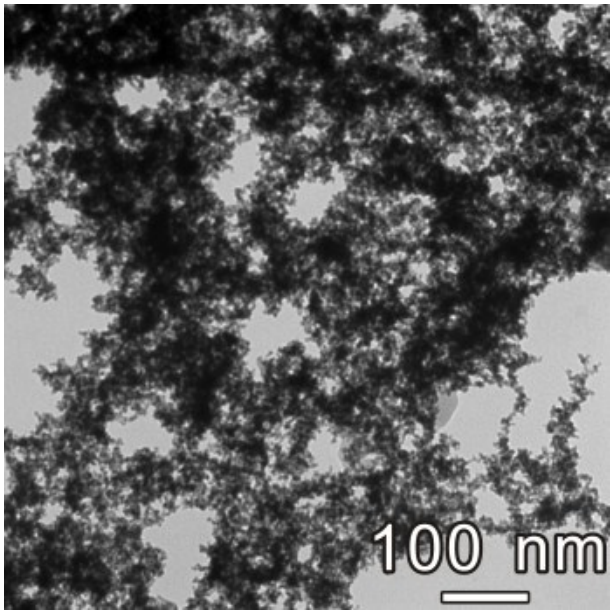

Figure S10 TEM image of the products obtained in the absence of PVP.

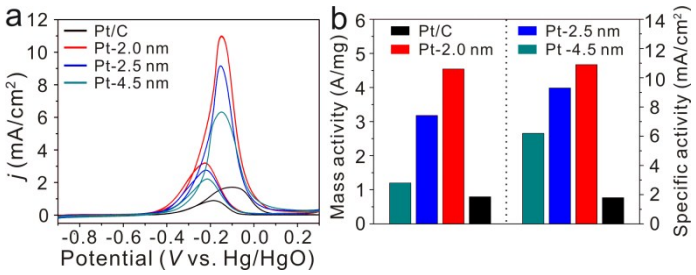

Figure S11 (a) ECSA-normalized curves of different catalysts for MOR, (b) Mass-normalized and ECSA-normalized activities of four Pt catalysts toward MOR.

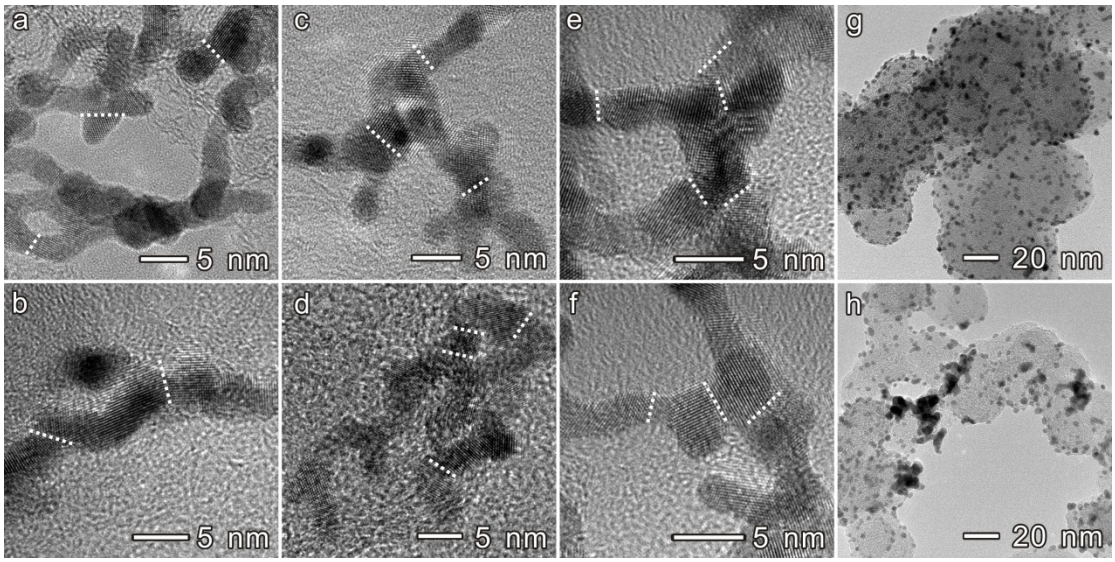

Figure S12 TEM images of the four Pt catalysts before (a, c, e, g) and after (b, d, f, h) ADTs. (a, b) Pt-2.0 nm, (c, d) Pt-2.5 nm, (e, f) Pt-4.5 nm, and (g, h) Pt/C. The white dashed lines indicate planar defect.