

Supplementary Information

Templating synthesis of ternary PtPdTe nanowires with tunable diameter for methanol electrooxidation

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Experimental Section

Materials. All chemicals were of analytic grade purity obtained from Sinopharm Chemical Reagent Co., Ltd., and used as received without further purification.

Synthesis of Te nanowires with different diameters (7 nm, 10 nm, 20 nm, 40 nm, 80 nm)

Synthesis of Te nanowires with different diameters was reported recently.^{S1} In the typical synthesis, 0.0922 g of Na₂TeO₃ and 1.0000 g of Poly(vinyl pyrrolidone)(PVP, Shanghai Reagent Company, MW \approx 40,000) were put into a 50 mL Teflon-lined stainless steel autoclave and different amount of acetone, from 0 mL, 5 mL, 8 mL, 10 mL, to 13 mL. After that, 3.33 mL of aqueous ammonia solution (25-28%, w/w %) and 1.67 mL of hydrazine hydrate (85%, w/w %) were added into the mixed solution, respectively, under vigorous magnetic stirring. After that, ethylene glycol (EG) was added to 80 % of the container. The container was then closed and maintained at 180 °C for 3 h. After that, the autoclave was cooled to room temperature naturally.

Synthesis of PtPdTe nanowires with different diameters (10 nm, 20 nm, 40 nm, 60 nm, 100 nm)

In a typical synthesis, 0.078 mmol of Te nanowires (the diameter of 7 nm, 10 nm, 20 nm, 40 nm and 80 nm), 0.009 mmol of K_2PtCl_6 and 0.009 mmol of K_2PdCl_6 in 30 ml of EG with vigorous magnetic stirring for 10 min at room temperature. Then, the mixed solution was shaken at a rotation rate of 260 rpm using an Innova 40 Benchtop Incubator Shaker at 60 °C for 12 h. After synthesis, the obtained PtPdTe nanowires were precipitated by acetone, then washed several times with deionized water and ethanol. Finally, the products dried in a vacuum at 60 °C for characterization.

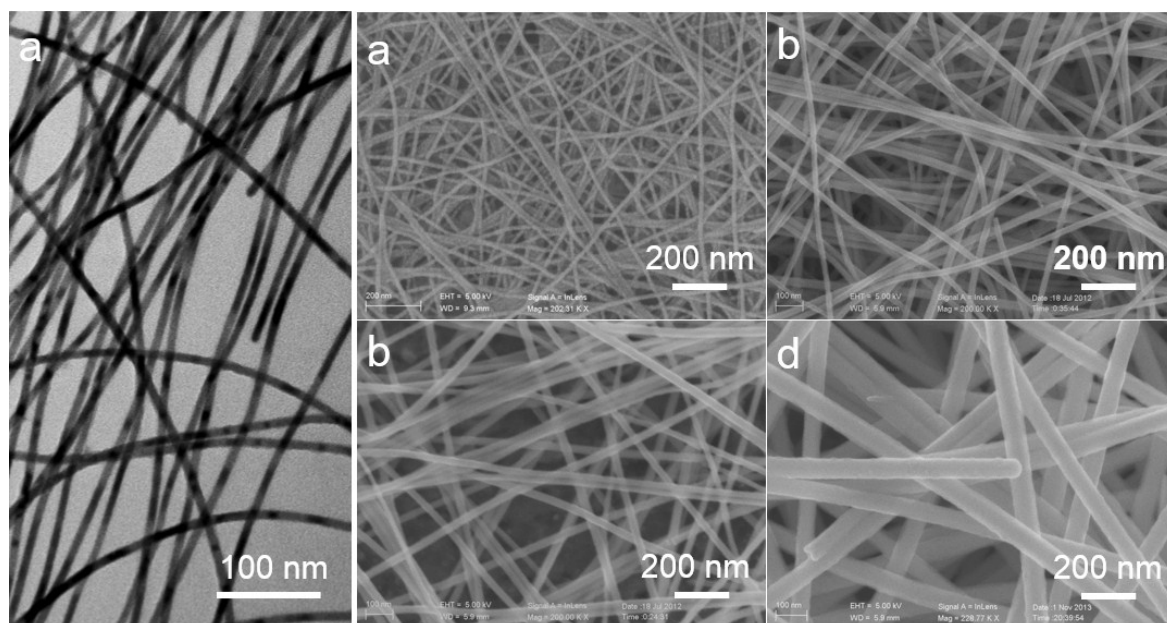


Fig. S1. TEM and SEM images of Te nanowires with different diameters: (a) 7 nm, (b) 10 nm, (c) 20 nm, (d) 40 nm and (e) 80 nm.

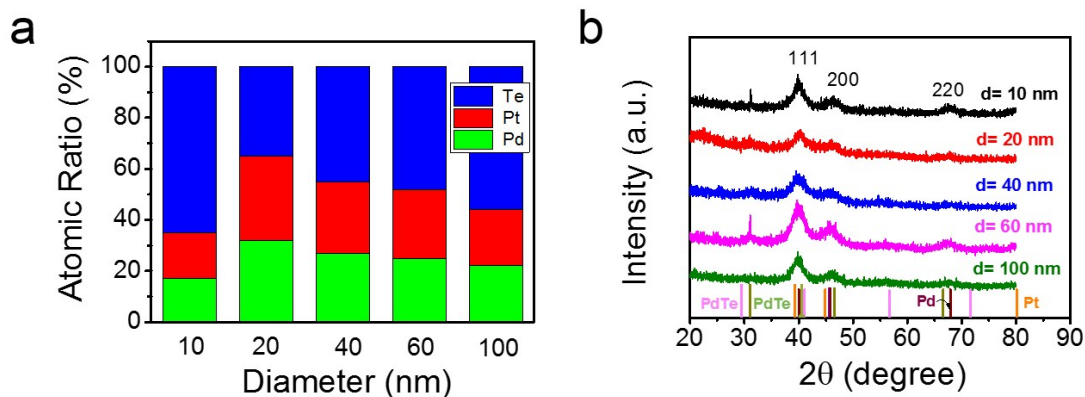


Fig. S2. ICP spectra and XRD patterns for the obtained PtPdTe nanowires with different diameters: (a) survey of the sample; (b-d) survey of the Pt, Pd, and Te 3d region, respectively.

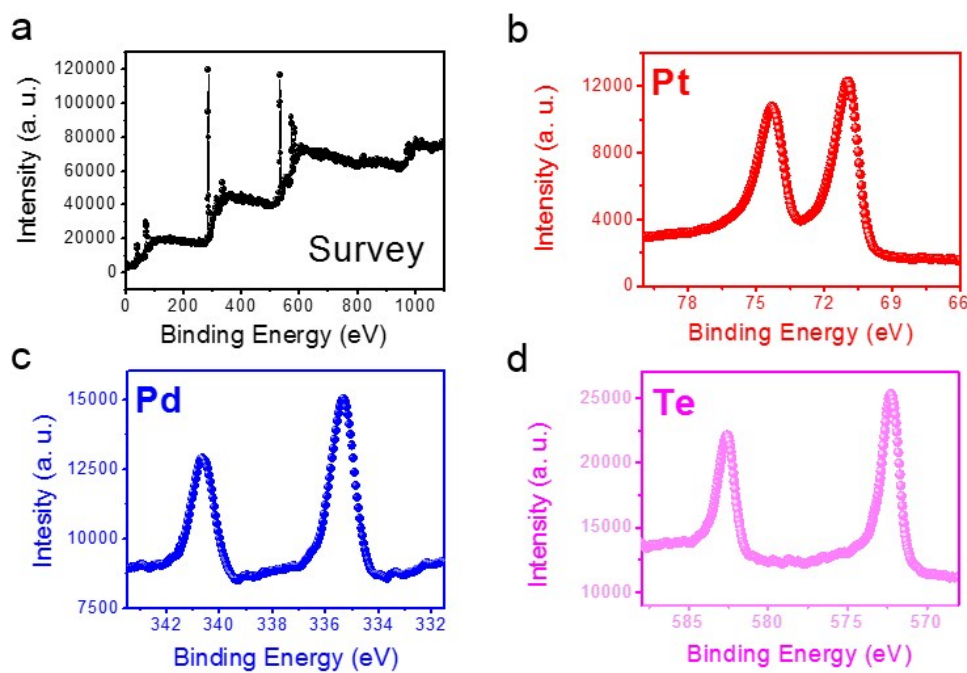


Fig. S3. XPS spectra for the obtained PtPdTe nanowires: (a) survey of the sample; (b-d) survey of the Pt, Pd and Te region, respectively.

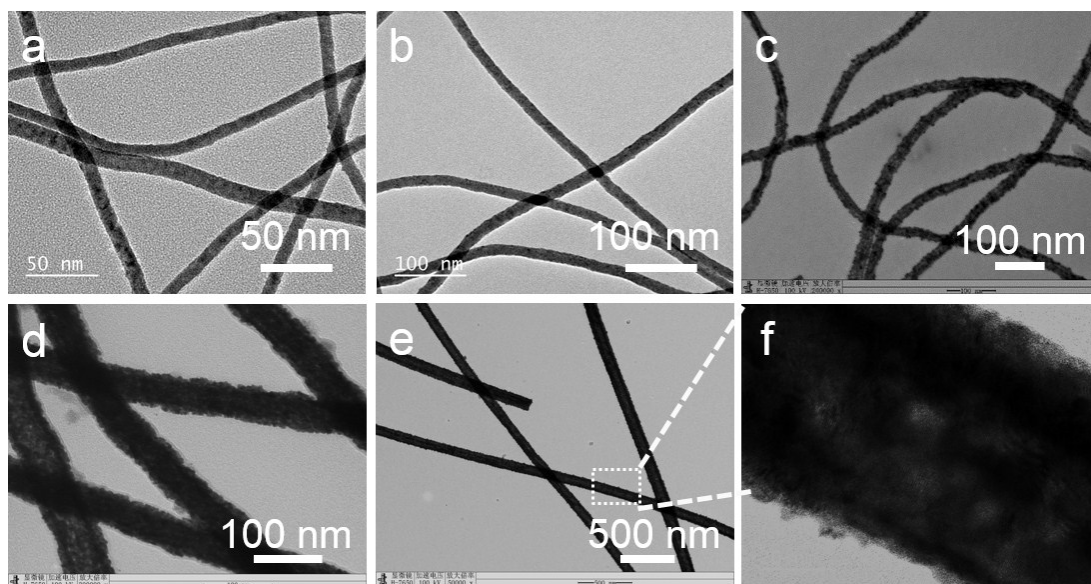


Fig. S4. TEM images of PtPdTe nanowires with increasing diameter.

Reference

- S1. J.-W. Liu, J. Xu, W. Hu, J.-L. Yang and S.-H. Yu, *ChemNanoMat*, 2016, DOI:10.1002/cnma.201500206.