

## **Te nanowires: facile synthesis and application in the preparation of PtTe nanowires for ammonia oxidation**

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## **Experimental**

### **Chemicals**

Trisodium citrate and ascorbic acid (AA) were purchased from Sinopharm Chemical Reagent Co. Ltd.  $K_2PtCl_4$ ,  $Na_2TeO_3$ , and KOH were purchased from Shanghai Aladdin Chemical Reagent Co. Ltd.  $NH_3 \cdot H_2O$  (25-28%) was purchased from Yantai Shuangshuang Chemical Reagent Co. Ltd. Absolute alcohol was purchased from Tianjin Fengchuan Chemical Reagent Co. Ltd. Hydrochloric acid was purchased from Kaifeng kaihua Chemical Reagent Co. Ltd.  $NaBH_4$ , Pluronic® F127, Nafion solution (Dupont, 5 wt%) and commercial Johnson Matthey Pt/C catalyst (Pt: 20 wt%) were purchased from Sigma Aldrich.

### **Study on the growth process of the Te NWs**

To investigate the growth process of the Te NWs, a very small amount of the reaction liquid after adding the  $NaBH_4$  solution was taken out and dripped onto a silicon wafer at 5 min, 15 min, 30 min, 45 min, and 60 min, respectively. The silicon wafers with the reaction liquid were dried immediately in an oven at 40 °C. The Te NWs synthesized under different reaction times (2h and 4h) were collected by vacuum filtration and rinsed with a small amount of deionized water followed by drying in an oven at 40 °C.

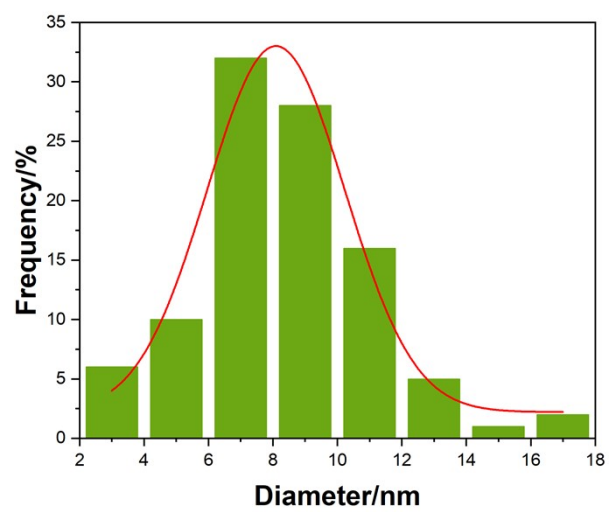


Fig. S1 The diameter distribution of the Te NWs that were grown for 6 hours.

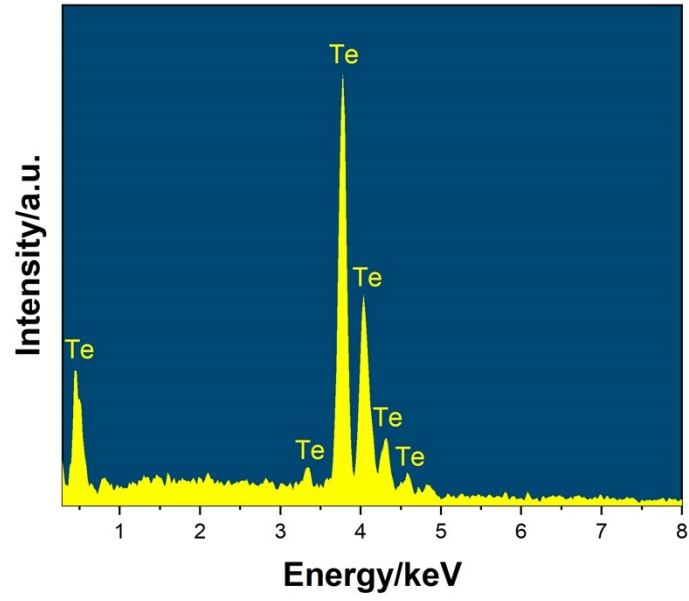


Fig. S2 The EDS spectrum of the Te NWs that were grown for 6 hours.



Fig. S3 The FESEM image of the Te NWs that were grown for 5 minutes.

Fig. S3 shows the FESEM image of the Te NWs that were grown for 5 minutes. The Te NWs have been formed with a short length of ca. 59.4~252.7 nm.

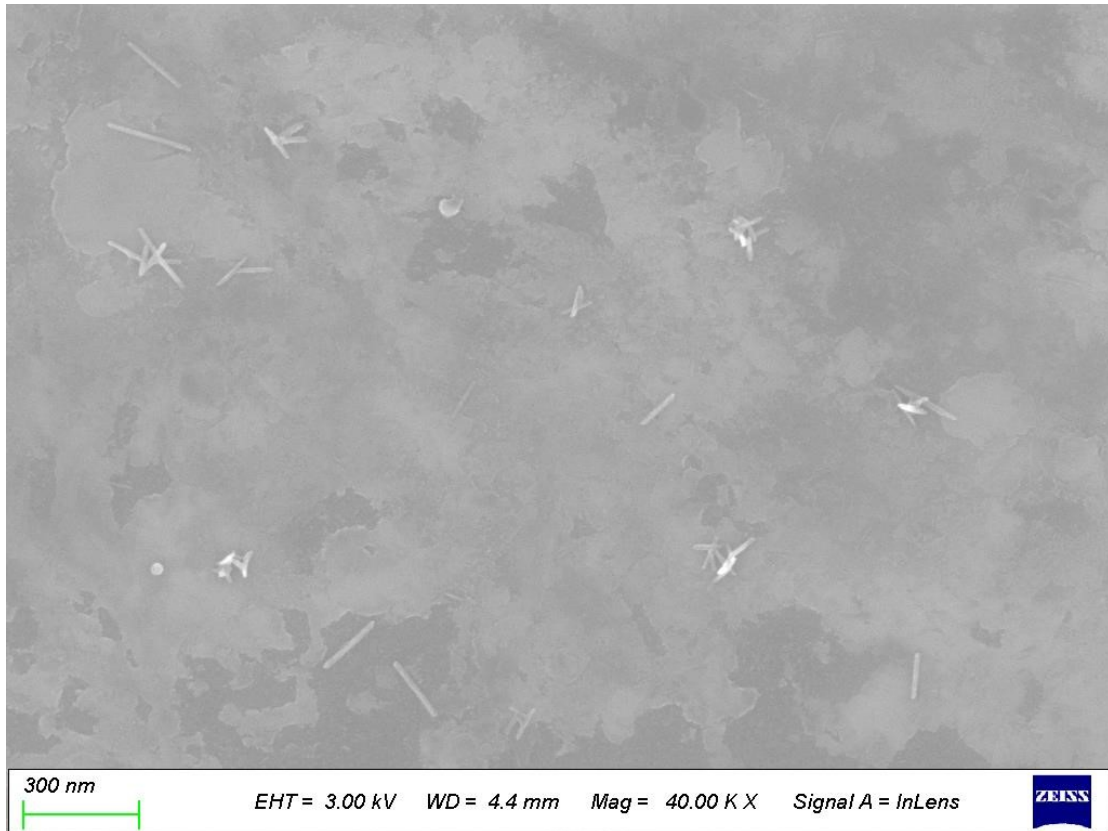


Fig. S4 The FESEM image of the Te NWs that were grown for 15 minutes.

Fig. S4 shows the FESEM image of the Te NWs that were grown for 15 minutes. The size of the Te NWs does not increase.

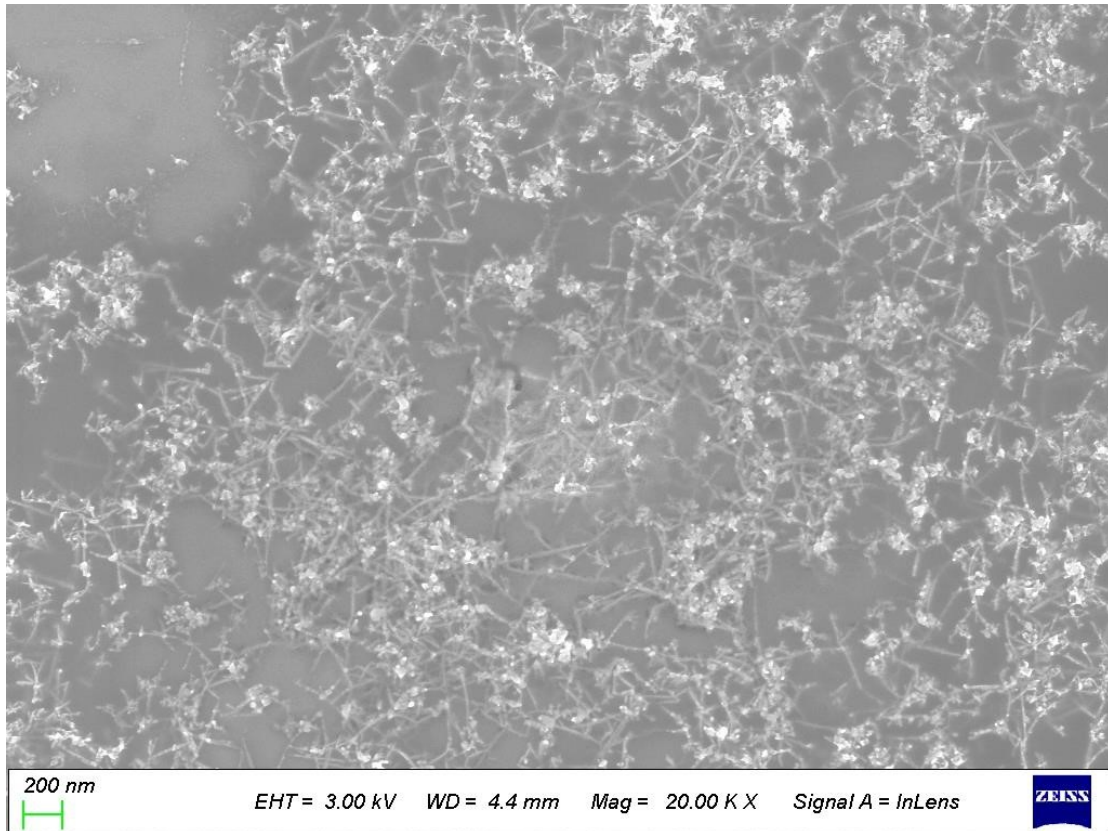


Fig. S5 The FESEM image of the Te NWs that were grown for 30 minutes.

Fig. S5 shows the FESEM image of the Te NWs that were grown for 30 minutes. The number and length of the Te NWs increase obviously. The ends of the Te NWs are always covered, so it is difficult to measure the length of the Te NWs. The length of the visible part of several Te NWs is over 700 nm.

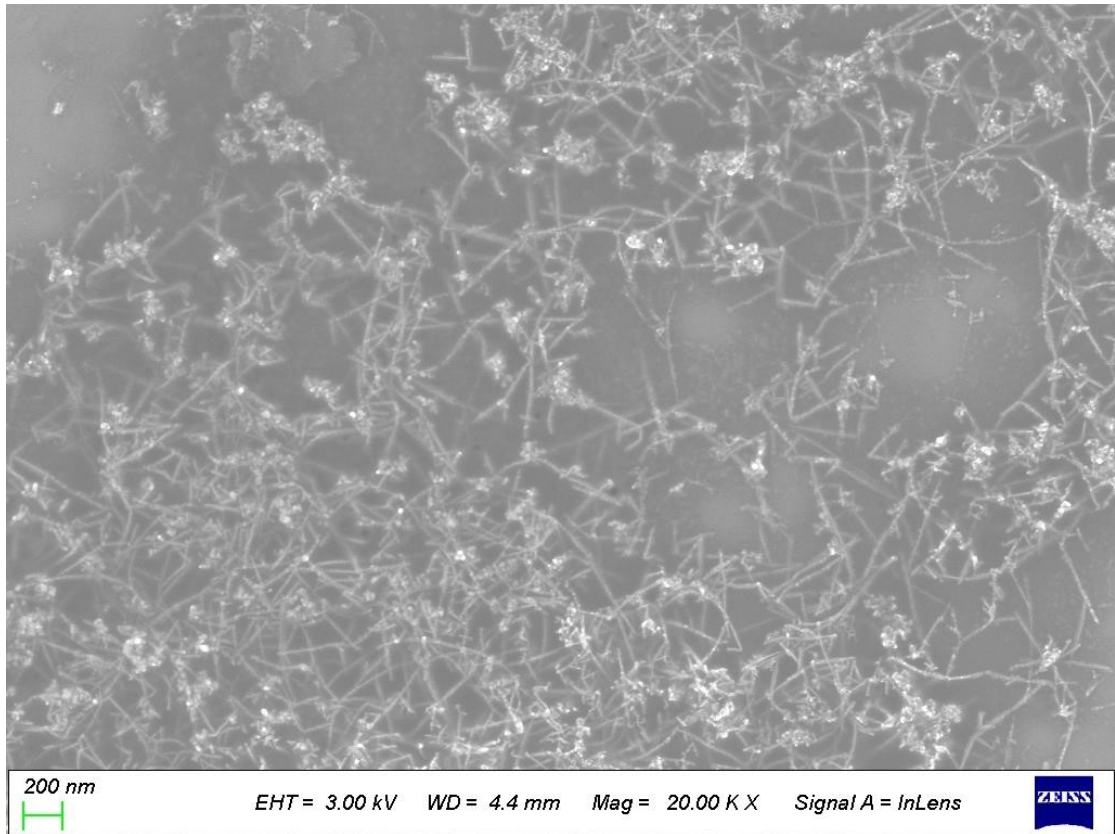


Fig. S6 The FESEM image of the Te NWs that were grown for 45 minutes.

Fig. S6 shows the FESEM image of the Te NWs that were grown for 45 minutes. The length of the visible part of several Te NWs is ca. 1  $\mu\text{m}$ .



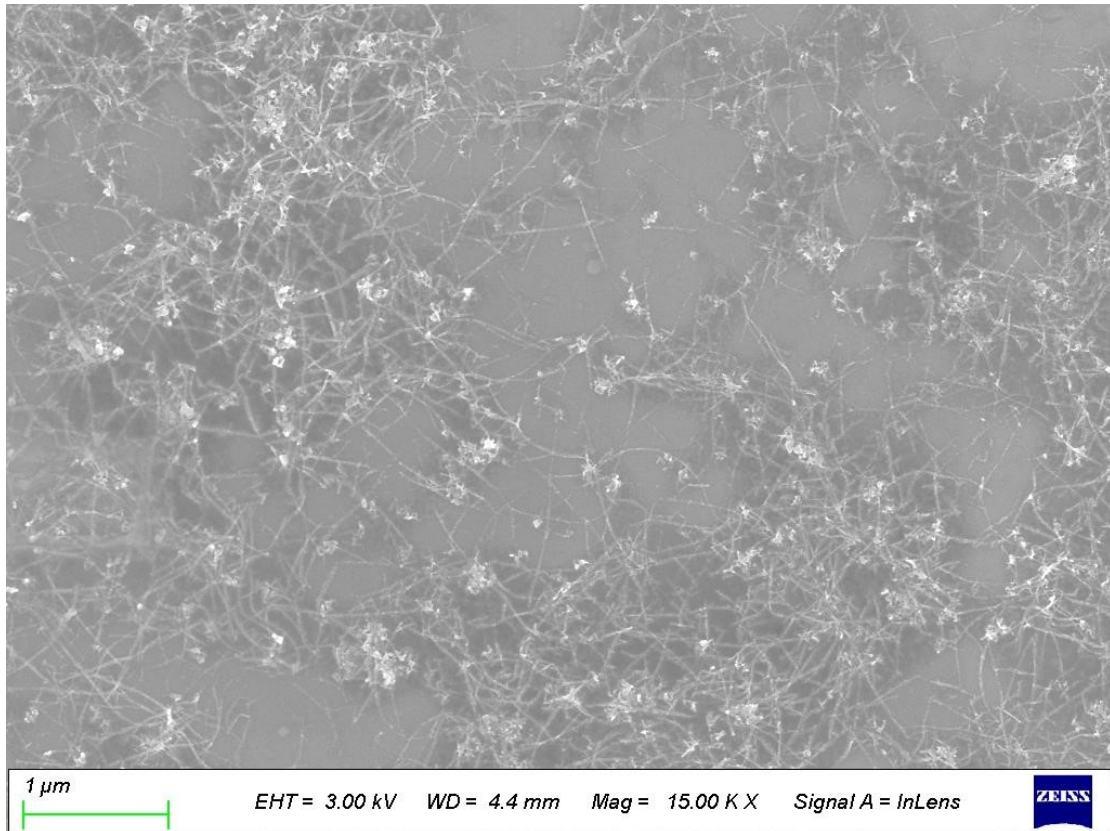


Fig. S7 The FESEM image of the Te NWs that were grown for 60 minutes.

Fig. S7 shows the FESEM image of the Te NWs that were grown for 60 minutes. Some NWs were grown up to over 3.5 μm.

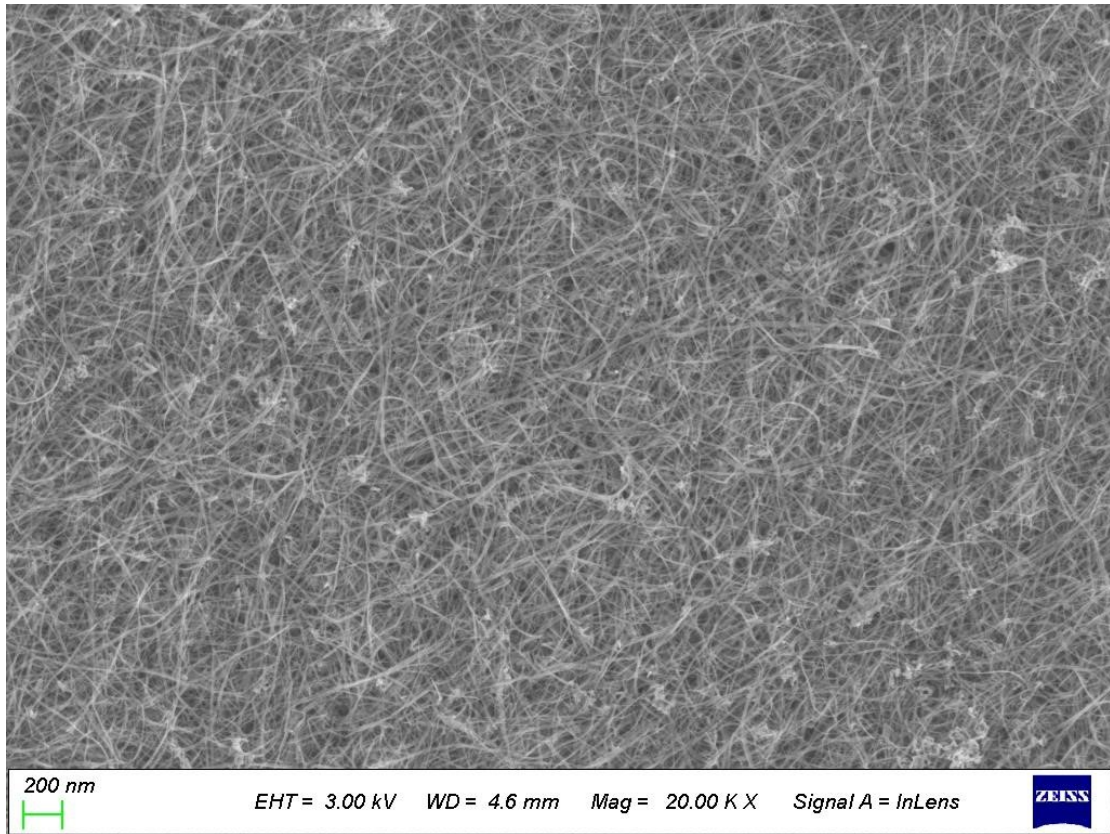


Fig. S8 The FESEM image of the Te NWs that were grown for 2 hours.

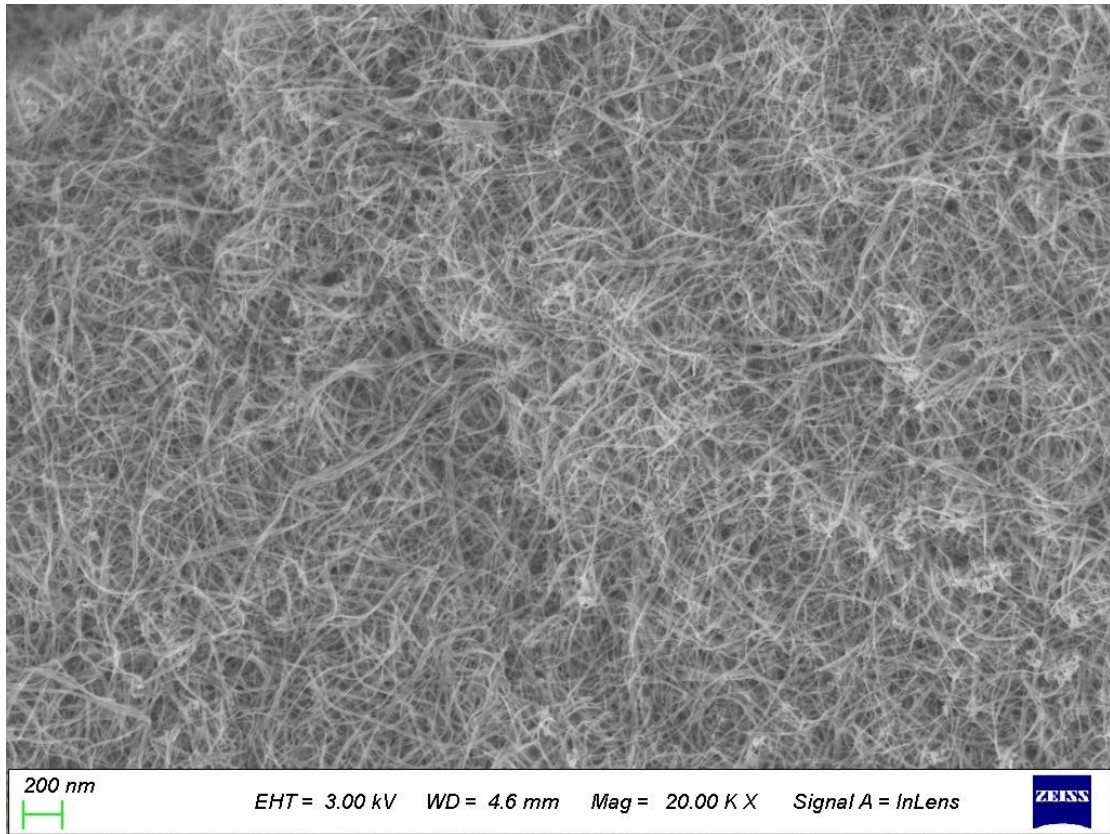


Fig. S9 The FESEM image of the Te NWs that were grown for 4 hours.

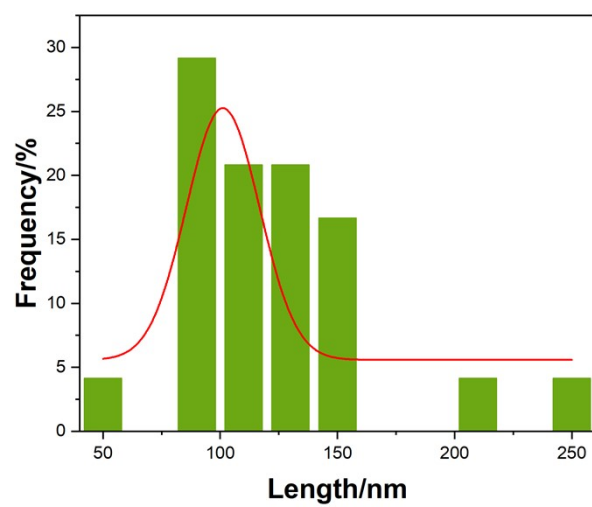


Fig. S10 The length distribution of the Te NWs that were grown for 5 minutes.

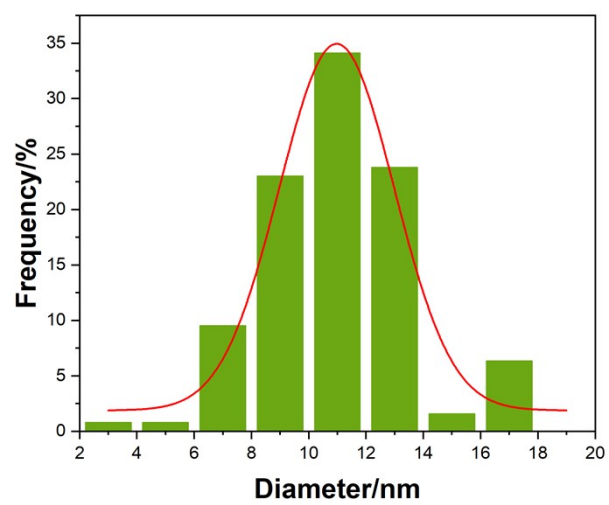


Fig. S11 The diameter distribution of the PtTe NWs.

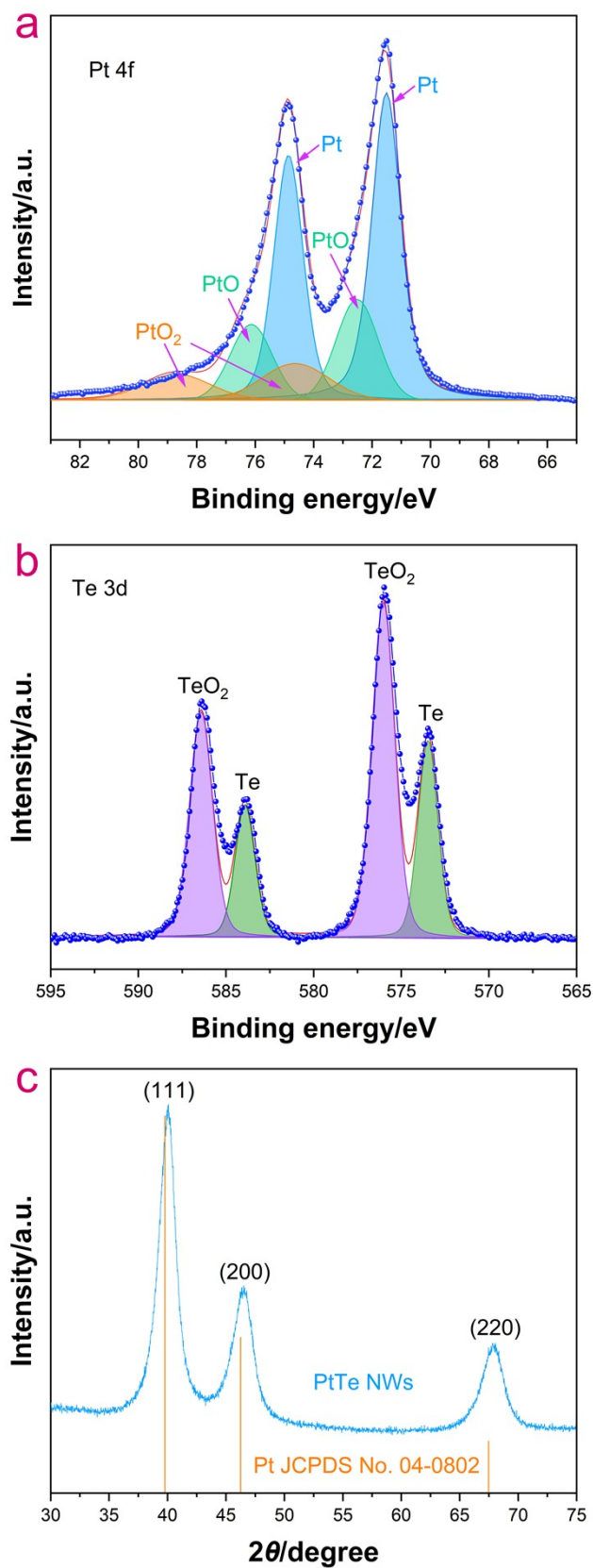


Fig. S12 (a) The Pt 4f and (b) Te 3d XPS spectra, and (c) the XRD pattern of the PtTe NWs.

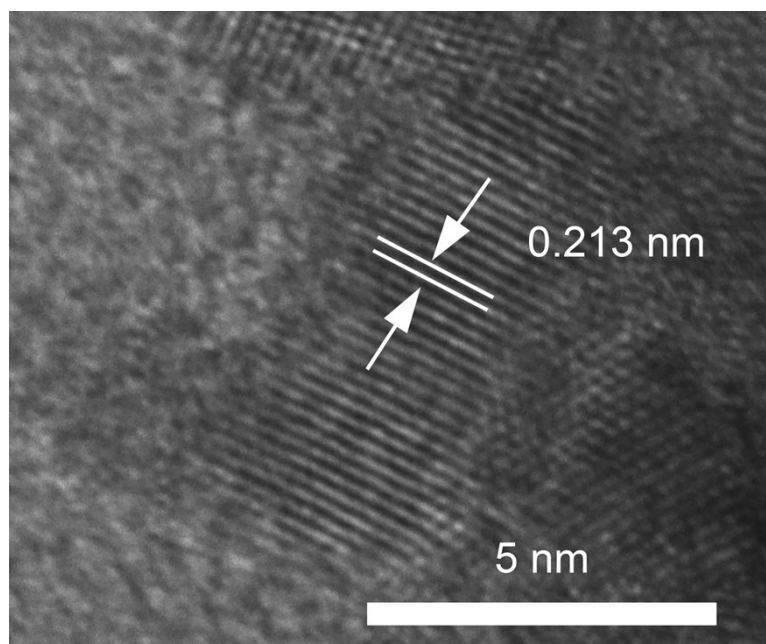


Fig. S13 The HRTEM image of PtTe NWs grown for 6 hours.

Table S1 The ICP results of the PtTe NWs

elements	wt (%)
Pt	81.13
Te	12.63

Table S2 The electrocatalytic performance of the catalysts

Catalysts	ECSA ( $\text{m}^2 \cdot \text{g}^{-1}$ )	Mass activity ( $\text{mA} \cdot \text{mg}^{-1} \text{ Pt}$ )	Specific activity ( $\text{mA} \cdot \text{cm}^{-2}$ )	CA test ( $\text{mA} \cdot \text{mg}^{-1} \text{ Pt}$ )	Retained activity
Pt/C	40.2	131.8	0.33	0.2	75.6
PtTe NWs	19.1	203.4	1.07	2.0	199.8