

**[Electronic Supplementary Information]**

**Growth of noble metal nanoparticles on single-layer TiS<sub>2</sub> and TaS<sub>2</sub> nanosheets for  
hydrogen evolution reaction**

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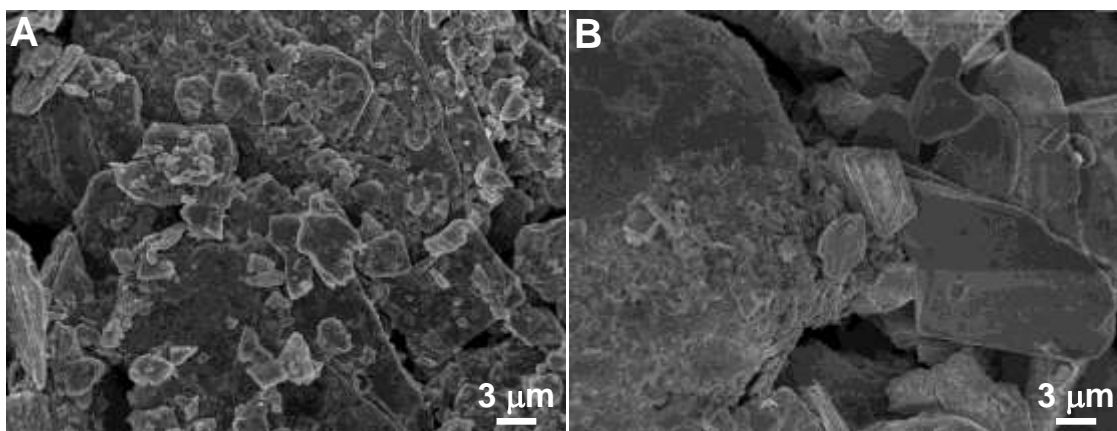
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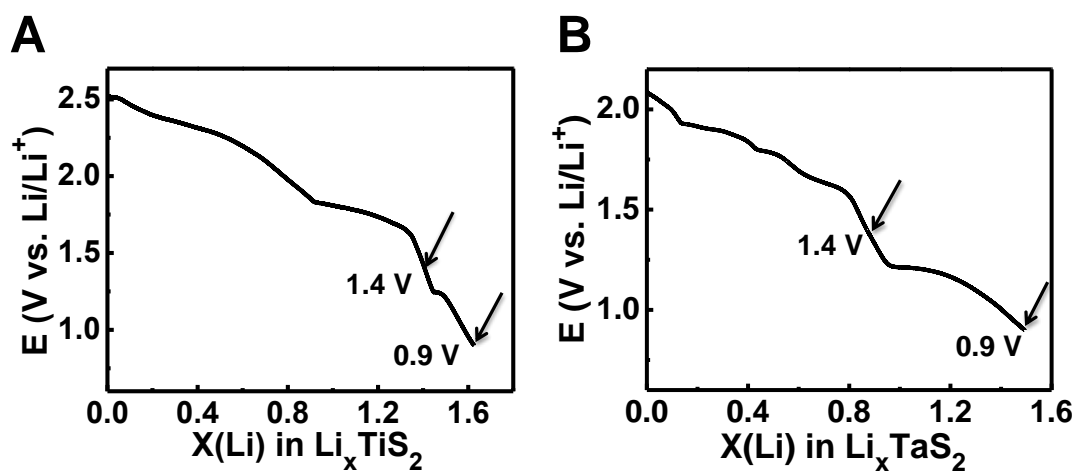
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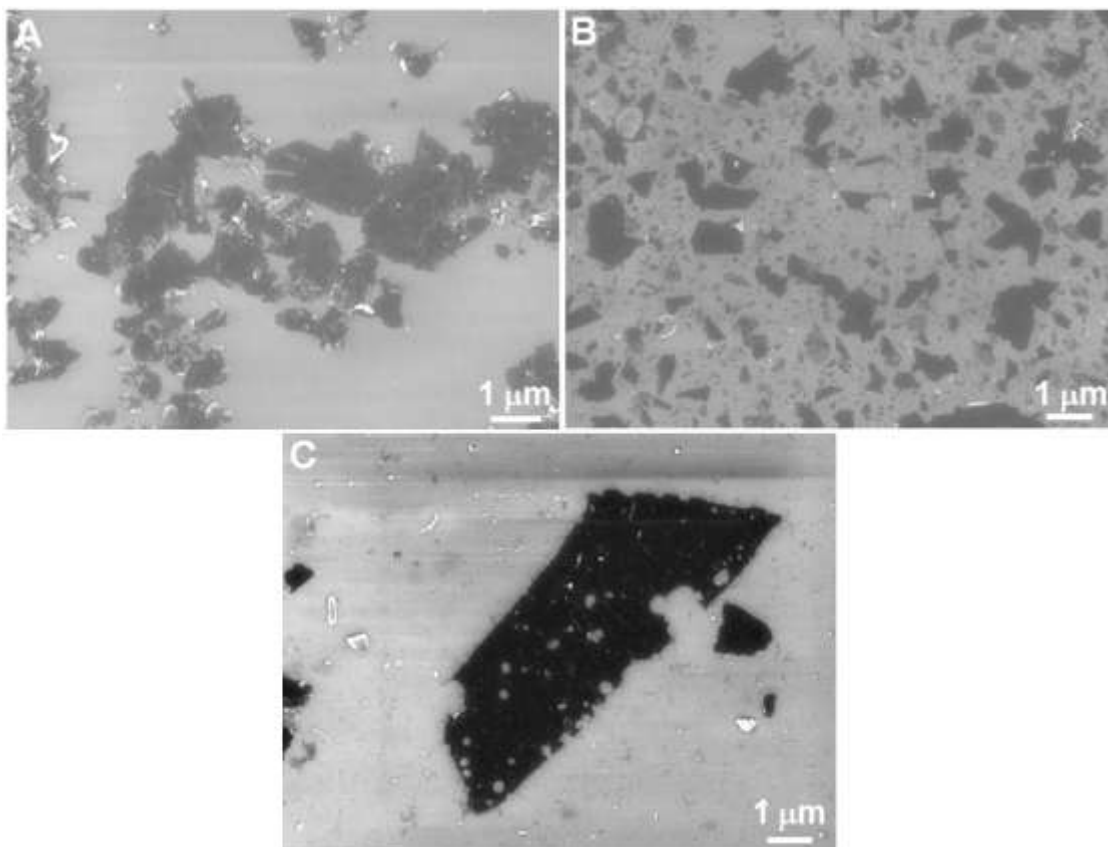
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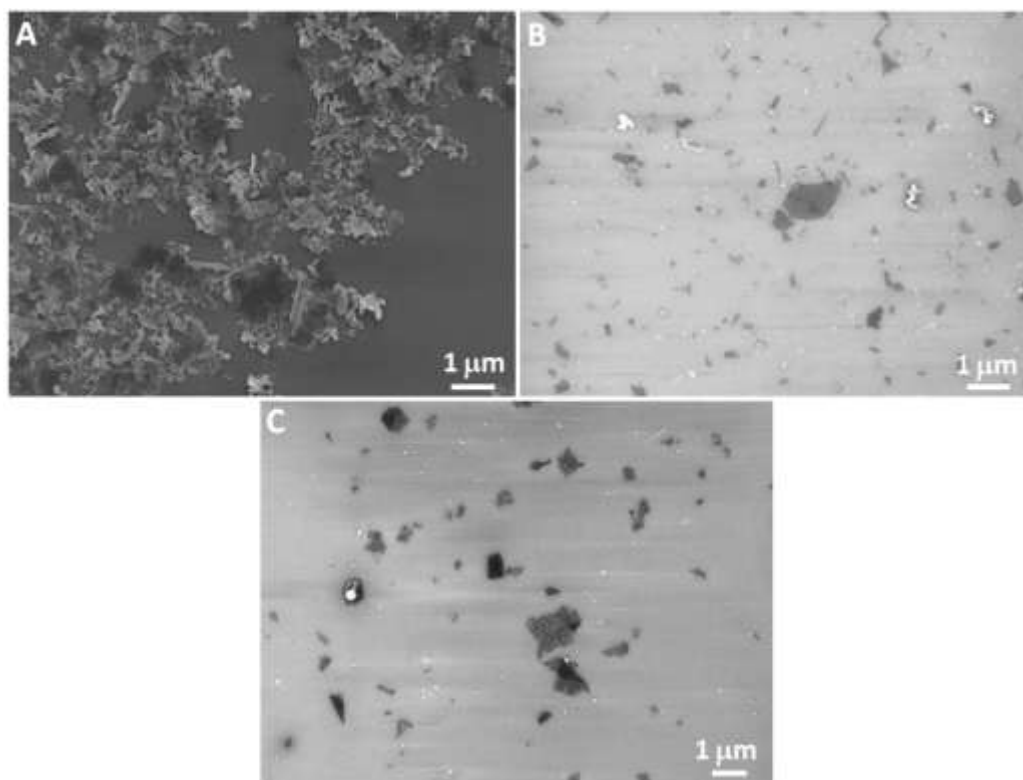
**Figure S1.** SEM images of (A) TiS<sub>2</sub> and (B) TaS<sub>2</sub> powder.



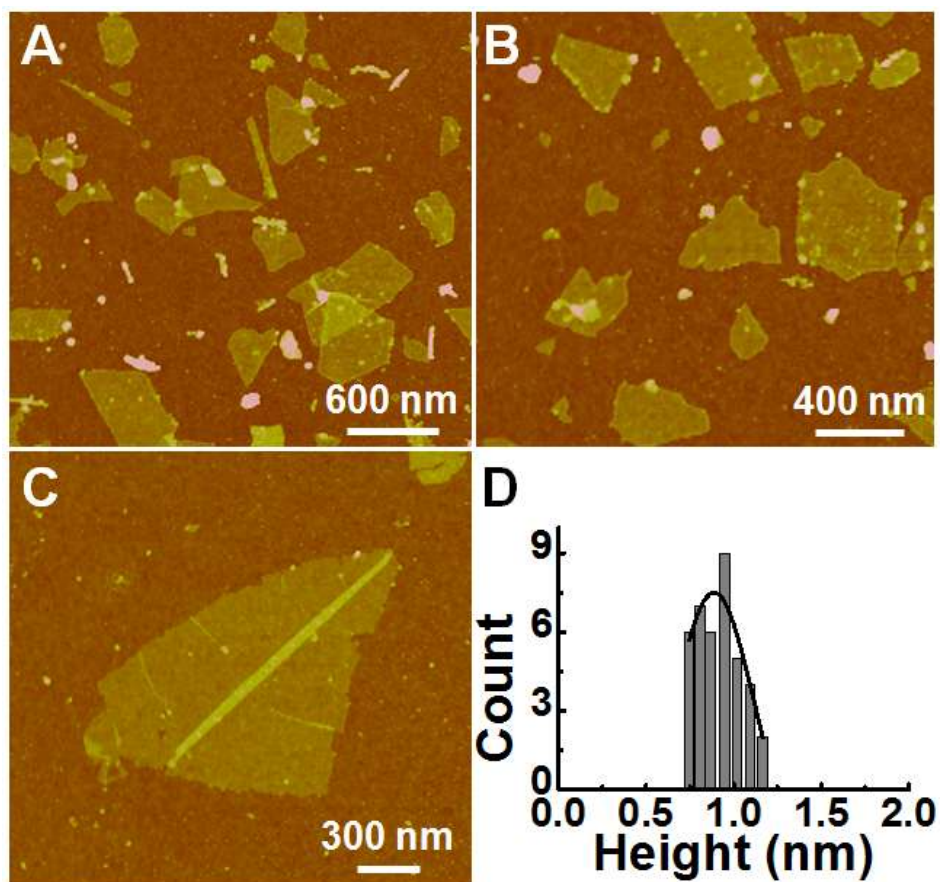
**Figure S2.** Galvanostatic discharge curves for (A) TiS<sub>2</sub> and (B) TaS<sub>2</sub>.



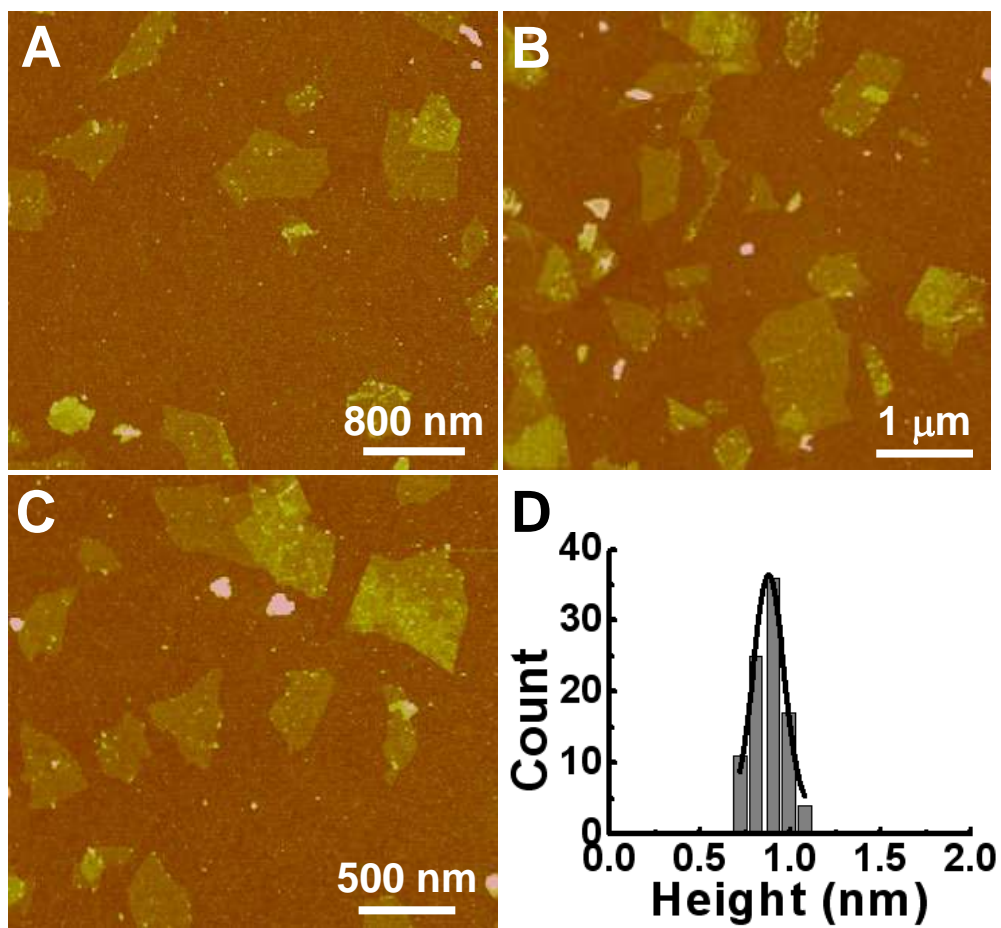
**Figure S3.** SEM images of the produced  $\text{TiS}_2$  at different experimental conditions: (A) at the cut-off voltage of 1.4 V; (B) at the current of 0.05 mA; (C) without deoxygenation procedure.



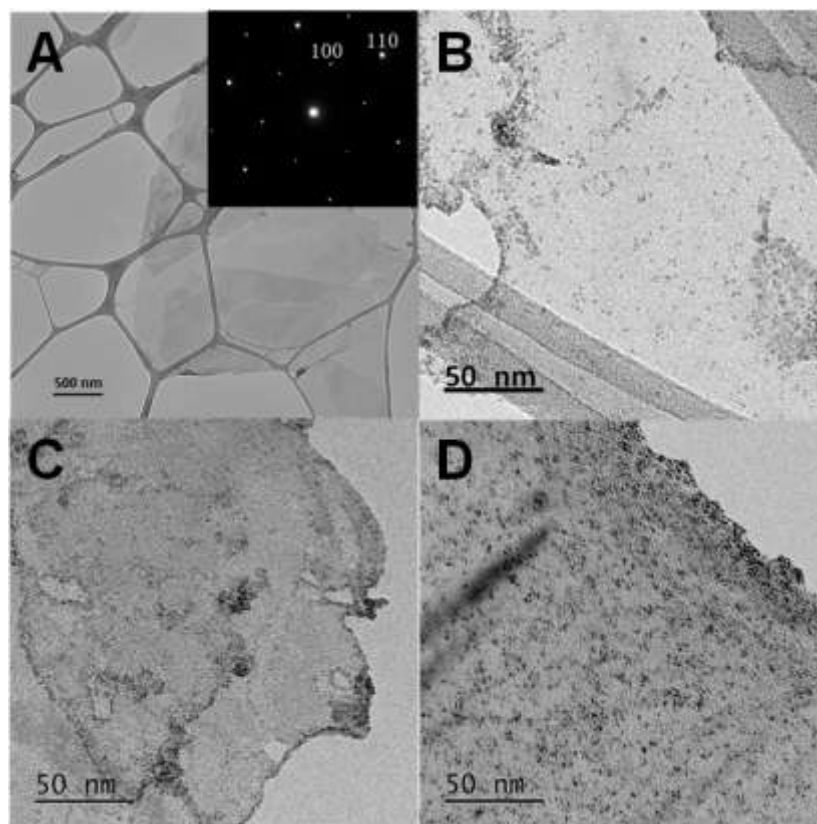
**Figure S4.** SEM images of the produced TaS<sub>2</sub> at different experimental conditions: (A) at the cut-off voltage of 1.4 V; (B) at the current of 0.05 mA; (C) without deoxygenation procedure.



**Figure S5.** (A-C) Large-area AFM images of TiS<sub>2</sub> nanosheets deposited on Si/SiO<sub>2</sub> substrates. (D) By measuring 100 TiS<sub>2</sub> nanosheets, it is found that 39% of them are single-layer with average thickness of  $0.9 \pm 0.2$  nm.



**Figure S6.** (A-C) Large-area AFM images of TaS<sub>2</sub> nanosheets deposited on Si/SiO<sub>2</sub> substrates. (D) By measuring 100 TaS<sub>2</sub> nanosheets, it is found that 93% of them are single-layer with average thickness of  $0.9 \pm 0.1$  nm.



**Figure S7.** TEM images of (A) TiS<sub>2</sub> nanosheets, Pt NPs grown on TiS<sub>2</sub> nanosheets at different reaction time: (B) 0.5 h, (C) 1 h and (D) 2 h.

**Table S1.** The Tafel slopes of Pt-TiS<sub>2</sub> hybrid materials prepared at different reaction time.

Sample	Cycle	b (mV/dec)
Pt-TiS <sub>2</sub> (0.5 h)	Before 1000 cycles	80.7
Pt-TiS <sub>2</sub> (1 h)	Before 1000 cycles	55.8
Pt-TiS <sub>2</sub> (2 h)	Before 1000 cycles	40.6