Supporting Information

Realization of High Curie Temperature Ferromagnetism in Atomically Thin MoS_2, WS_2 Nanosheets with Uniform and Flower-like Morphology

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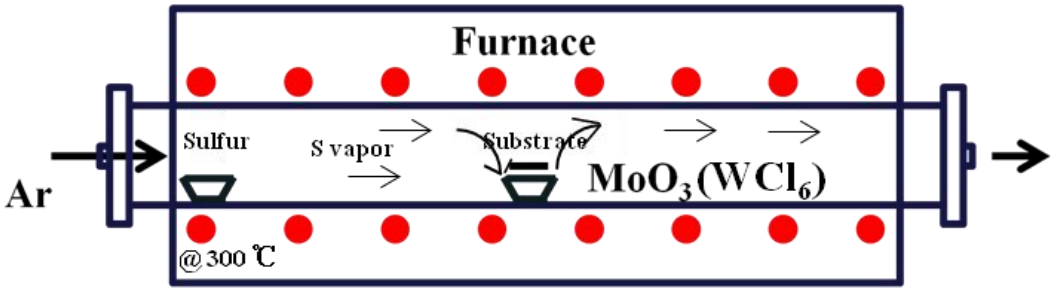

Fig. S1 Schematic diagram of the reaction setup used for growing the atomically thin MoS_2 and WS_2 nanosheets by chemical vapor deposition.

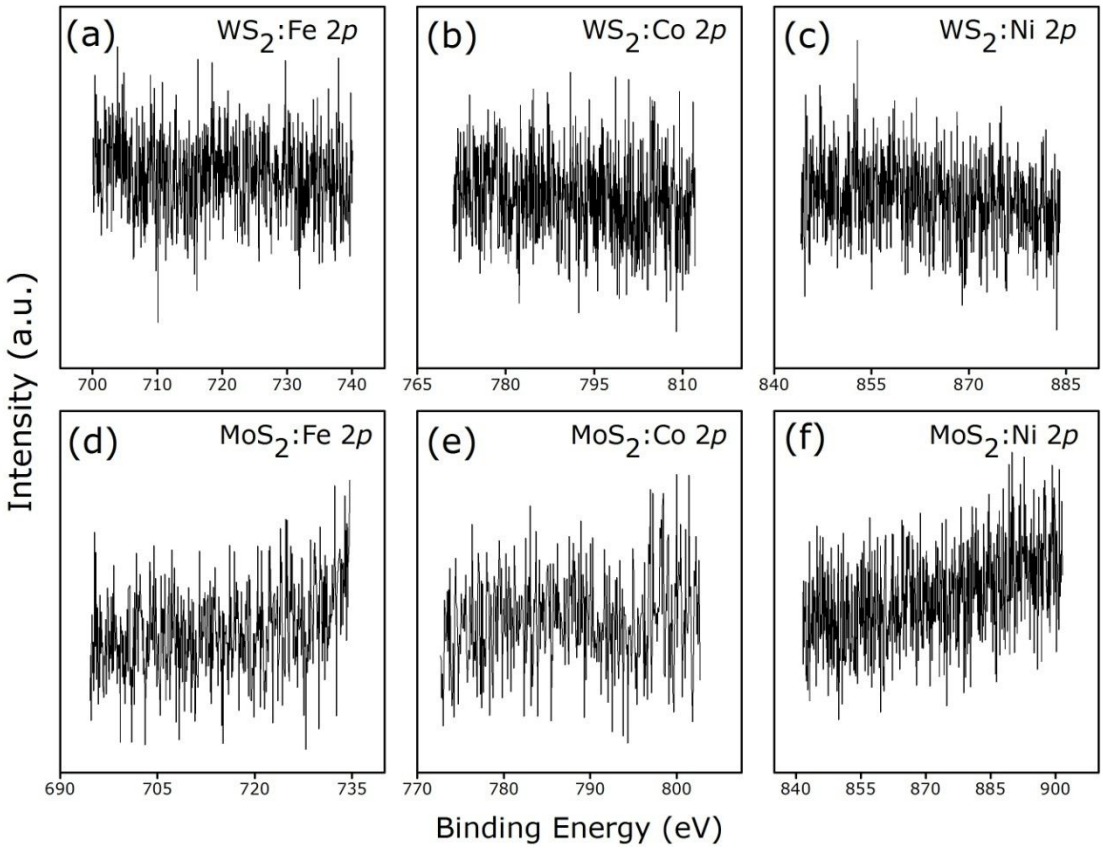

Fig. S2 Absence of magnetic elements Fe, Co and Ni has been confirmed by the high-resolution XPS scan of Fe 2*p* [(a) and (d)], Co 2*p* [(b) and (e)], and Ni 2*p* [(c) and (f)] in WS_2 and MoS_2 nanosheet samples.

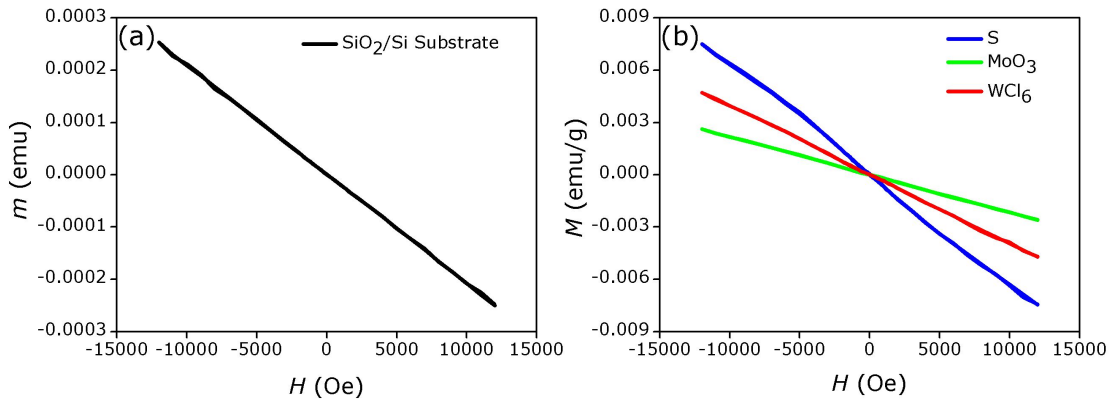

Fig. S3 *M-H* curves of the SiO_2/Si substrate (a) and precursors (b).

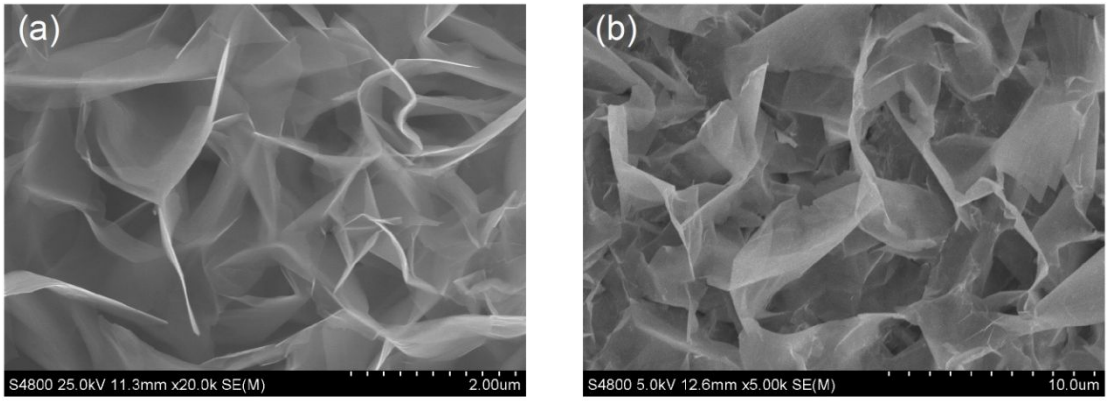

Fig. S4 SEM images of the MoS_2 (a) and WS_2 (b) nanosheets after annealing at 1000 °C in argon, the morphology of both samples remains the same with the as-prepared nanosheets.

The most direct and effective means to precisely prove the existing of defects in the nanosheets are observation of high-resolution transmission electron microscopy (HRTEM) images of the samples.[1-5] As can be seen from Fig. S5, the defects and dislocations exist clearly in both WS_2 (a, b) and MoS_2 (c, d) nanosheet systems.

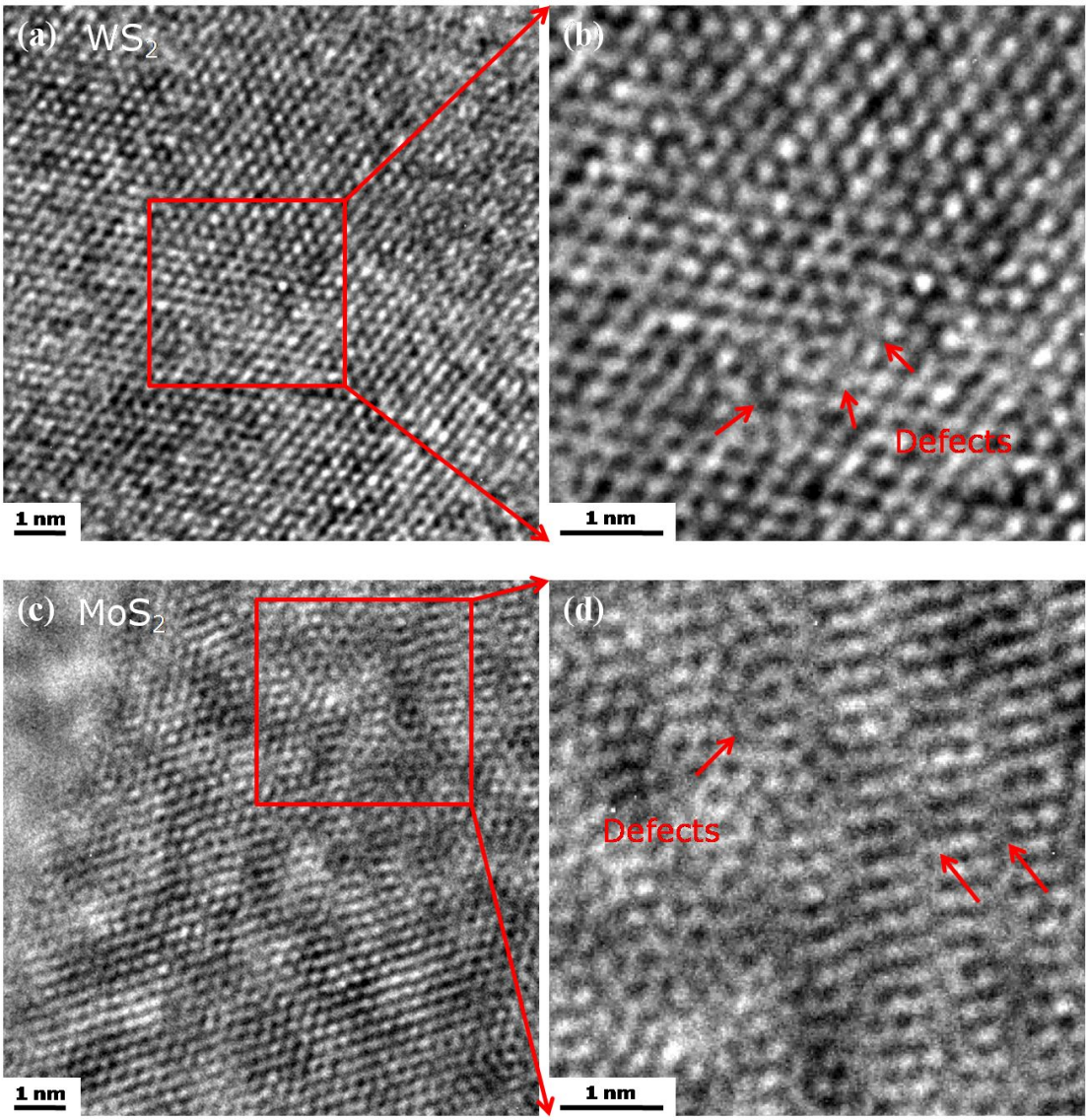

Fig. S5 HRTEM images of WS_2 (a, b) and MoS_2 (c, d) nanosheets. The defects and dislocations exist clearly in both nanosheet systems.

For better readability, we present the raw *M-H* curves before deducting any other signals as follows: (a) MoS_2, (b) WS_2. The curves below 300 K were measured by superconducting quantum interference device (SQUID), while others by vibrating sample magnetometer (VSM) equipped with high temperature chamber.

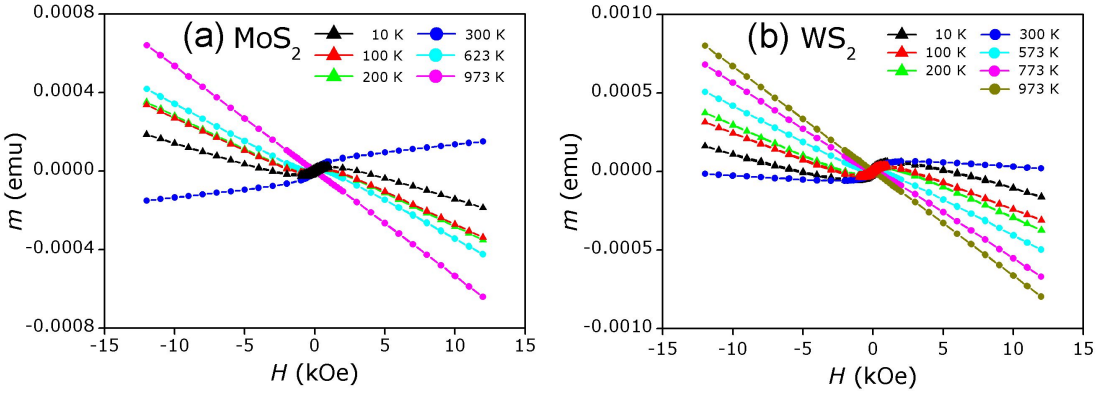

Fig. S6 Raw *M-H* curves of (a) MoS_2 and (b) WS_2 nanosheets before deducting any other signals.

Thermogravimetric (TG) analysis was employed to obtain the accurate masses of nanosheet samples. Because the mass of silicon substrate itself will change during CVD process, it cannot obtain the mass of nanosheet products by simply weighing the mass of substrate before and after the reaction process. In our case, we measured the TG curves variation with temperature in oxygen for each sample (as shown in Fig. S7).[6-8] Among them, the following chemical changes occurred during the heating

processes for MoS_2 and WS_2 nanosheets, respectively:

$$2MoS_2 + 7O_2 \rightarrow 2MoO_3\uparrow + 4SO_2\uparrow;$$

$$2WS_2 + 7O_2 \rightarrow 2WO_3 + 4SO_2\uparrow.$$

Combining with the weight loss processes which were described in Fig. S7, the mass of each nanosheet sample could be calculated.

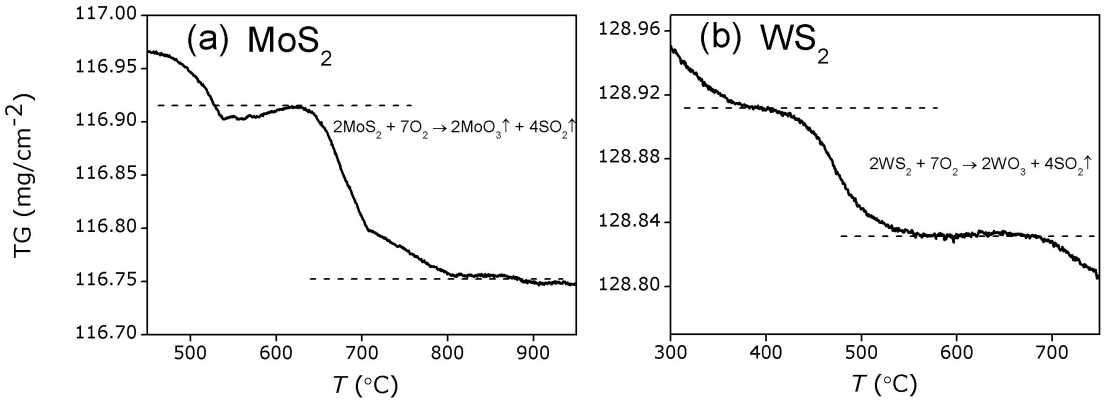

Fig. S7 TG analysis of (a) MoS_2 and (b) WS_2 nanosheet samples. The heating processes were taken in oxygen atmosphere, and the weight losses are mainly due to the oxidation processes (the MoO_3 will evaporate).

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