

Formation of WO₃ Nanotube-based Bundles Directed by NaHSO₄ and Its Application in Water Treatment

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Table S1. Pore size, BET surface area, micropore surface area and pore volume parameters of the sample.

sample	pore size (nm)	BET surface area ^a (m ² /g)	pore volume (cm ³ /g)	micropore surface area ^b (m ² /g)
as-obtained WO ₃	12.50	27.83	0.05	6.32

a: Calculated from the desorption branches. b: Calculated by the V-t method.



Scheme S1. A possible process of nitrogen liquefaction inside a long nanotube during BET measurement.

Scheme S1 describes a possible result of nitrogen absorption inside a long nanotube during BET measurement. Because the nanotube with the length of more than 1 μm (Fig. 1a and Fig. S2a) is too long, condensed nitrogen liquid can block two inlet of the nanotube. Thus not all inside surface can be occupied by nitrogen molecules, resulting in false data (surface area and pore volume) listed in Table S1.

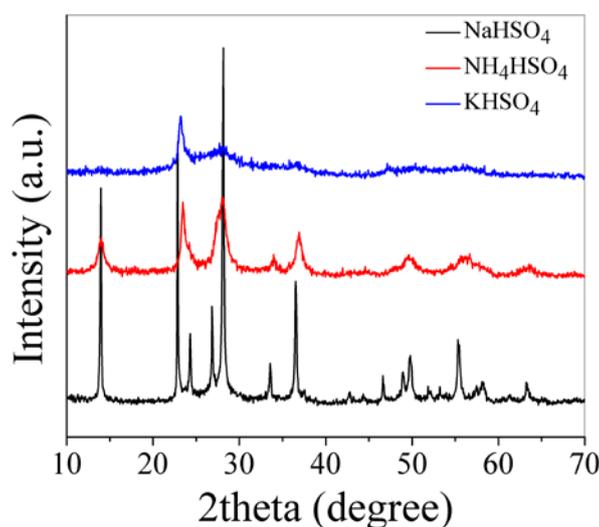


Fig. S1. XRD patterns of the as-obtained samples prepared with NaHSO₄, NH₄HSO₄, KHSO₄, respectively.

Fig. S1 presents XRD patterns of three WO₃ samples prepared with NaHSO₄, NH₄HSO₄ and KHSO₄, respectively. The sample from NaHSO₄ has highest crystallinity, while the crystallization of other two samples is quite different from NaHSO₄-assisted.

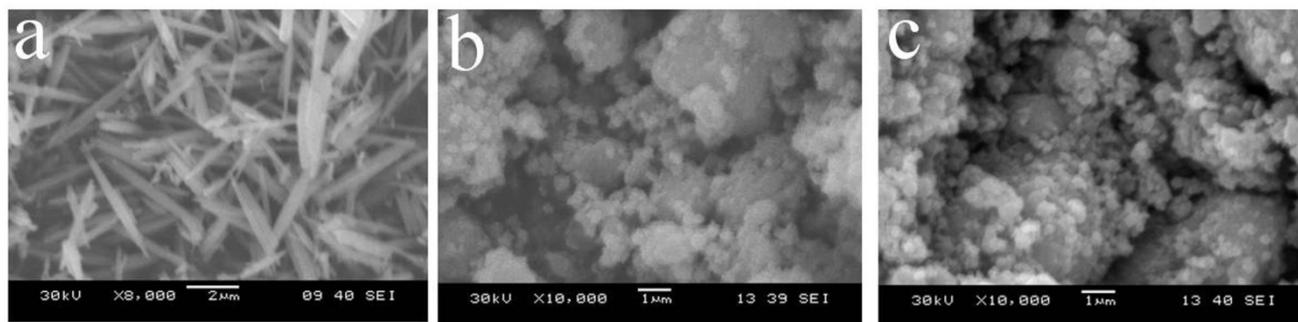


Fig. S2. SEM images of the WO_3 samples prepared with different reagents: (a) NaHSO_4 , (b) NH_4HSO_4 , (c) KHSO_4 .

The SEM observations (Fig. S2) can also present analogous result. Fig. S2a exhibits WO_3 sample from NaHSO_4 with rod-like morphology, but the others (Fig. S2 b,c) exhibit spherical morphology.

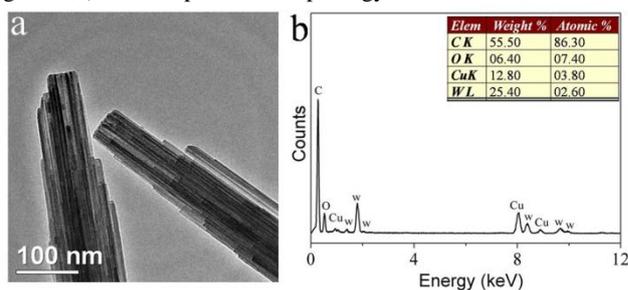


Fig. S3. (a) TEM image of the WO_3 sample in Fig. S2(a). (b) Energy dispersive X-ray spectroscopy (EDS) of the WO_3 sample in Fig. S3(a).

Fig. S3a is a TEM image of the WO_3 sample in Fig. S2a, and the structure of nanotube bundles can be seen. Furthermore, the chemical composition of the obtained nanotube bundles was analyzed by using energy-dispersive spectroscopy (EDS). The EDS spectrum (Fig. S3b) exhibits the existence of W and O with a molar ratio close to 1:3.