Supporting Information

Soft chemical topotactic synthesis and crystal structure evolution from two-dimension KV$_3$O$_8$ plates to one-dimension V$_3$O$_7$ nanobelts

Puhong Wen*, Taotao Liu, Fenyan Wei, Lili Ai and Fangyi Yao

Department of Chemistry and Chemical Engineering, Baoji University of Arts and Sciences, No. 1 Hi-Tech Avenue, Baoji, Shaanxi 721013, PR China.

* Corresponding author. Email: wenpuhong@hotmail.com

1. Chemical composition of samples KVO and HVO determined by EDX.

According to the analysis result of EDX spectra, the chemical formula of KVO sample is KV$_3$O$_8$, and that of HVO sample may be HV$_3$O$_8$·3H$_2$O.

2. Chemical composition of the V$_3$O$_7$ sample determined by XPS.
According to the analysis result (V/O = 9.51/23.46) of XPS spectrum, the chemical formula of the sample obtained by hydrothermally treating HVO nanobelts colloidal solutions at 180 °C for 12 h is V₃O₇.

3. FTIR spectrum of the obtained sample HVO.

Fig. S3 FTIR spectrum of the obtained sample HVO.

Stretching vibration peaks of V=O bonds: 998, 963 cm⁻¹;

Stretching vibration of V-O-V bonds: 710, 610 cm⁻¹;

Stretching vibration of O-H bonds: 3566, 3434 cm⁻¹;

Fig. S2 XPS survey spectrum (a) and V 2p XPS spectrum (b) of the sample obtained by hydrothermally treating HVO nanobelts colloidal solution at 180 °C for 12 h. The black curve is the experimental result. The dash curves are fitting results.
Bending vibration of H-O-H bond: 1612 cm$^{-1}$.

4. **FE-SEM images of the photoelectrode films of P25 and V$_3$O$_7$.**

Fig. S4 FE-SEM images of the photoelectrode films of P25(a, d) and V$_3$O$_7$(b, c).