

## Electronic Supplementary Information

### Hydrothermal preparation and optical properties of orientation-controlled WO<sub>3</sub> nanorod arrays on ITO substrates

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#### 1. Effect of the pH value on WO<sub>3</sub> nanorod arrays growth

##### 1) When the pH values are controlled at 2.3 and 2.5:

Figure S1 shows the SEM images of the products synthesized at pH values equal to 2.3 and 2.5 while other preparing conditions remain constant. The well oriented WO<sub>3</sub> nanorods arrays with high growth density can be obtained when the pH value is 2.3 as shown in Figure S1(a). With increasing pH value to 2.5, the orientation and growth density of as-prepared WO<sub>3</sub> nanorods arrays on ITO substrate become poorer and lower respectively as shown in Figure S1(b). Therefore, based on the experiment results, the well aligned WO<sub>3</sub> nanorods arrays which are vertical to the substrates can only be gained when pH values are controlled in a specific range of 2.3 to 2.4.

##### 2) When the pH values are controlled at 3.0, 4.0, 6.0, 7.0, 9.0 and 12.0:

Figure S2 illustrates the SEM images of the products synthesized at pH values equal to 3.0, 4.0, 6.0, 7.0, 9.0 and 12.0 while other preparing conditions remain constant.

From Figure S2 it can be seen that WO<sub>3</sub> nanorod arrays can not be obtained when the

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final pH value is higher than 3.0.

## **2. Effect of $\text{H}_2\text{C}_2\text{O}_4$ on $\text{WO}_3$ nanorod arrays growth**

Figure S3 shows the SEM images of the products synthesized by using HCl (2 mol/L) instead of  $\text{H}_2\text{C}_2\text{O}_4$  to adjust the pH values as 2.0 and 2.4. The SEM images of products synthesized by controlling pH values only using HCl are similar to that by using  $\text{H}_2\text{C}_2\text{O}_4$ .

## **3. Effect of additive NaCl on $\text{WO}_3$ nanorod arrays growth**

Figure S4 gives the SEM images of the products prepared without NaCl as additive at 180°C for 4h when the final pH value of the precursor solutions is fixed at 2.4. None of  $\text{WO}_3$  nanorod arrays was obtained on ITO substrate. Only floc nanofibers were deposited on the substrate.

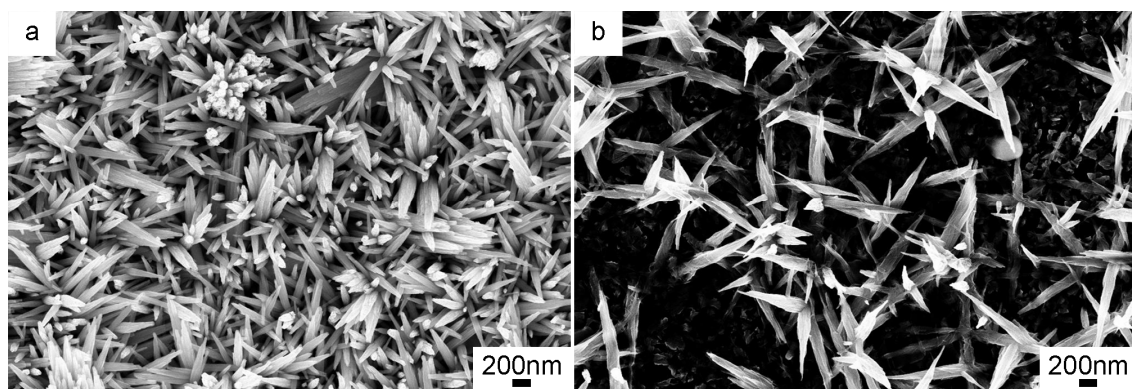


Figure S1. SEM images of products synthesized at different pH values: (a) pH=2.3, (b) pH=2.5

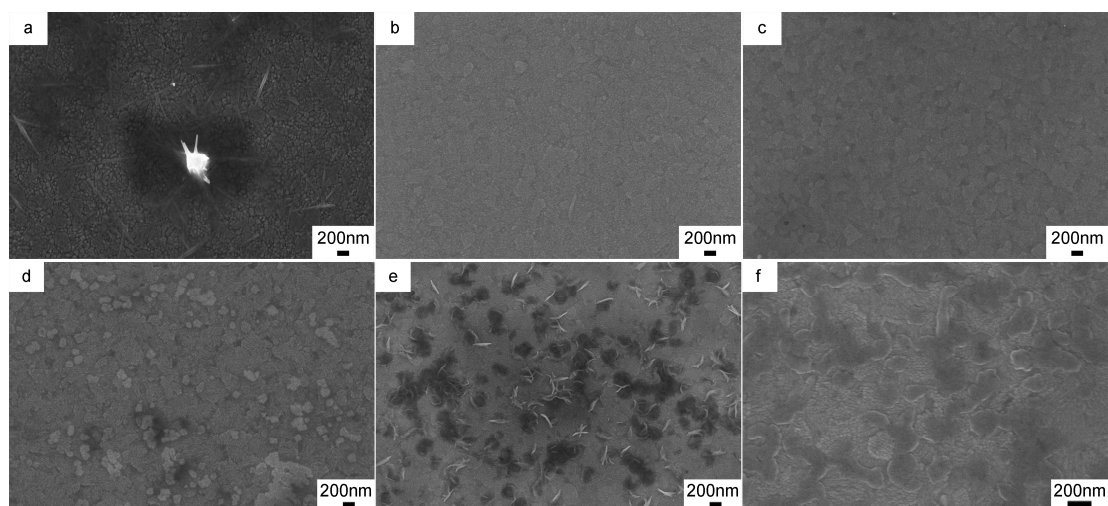


Figure S2. SEM images of the products synthesized in wide range of pH values: (a) pH=3.0, (b) pH=4.0, (c) pH=6.0, pH=7.0, pH=9.0 and pH=12.0.

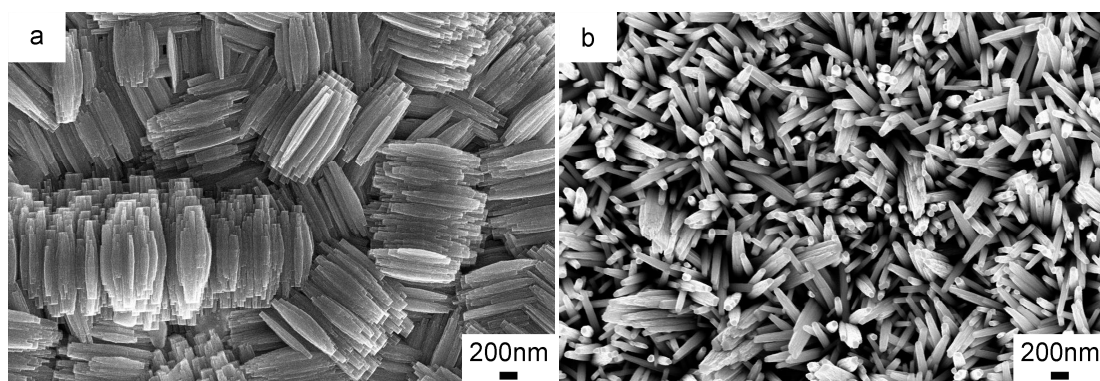


Figure S3. SEM images of the products synthesized by controlling the final pH values using HCl (2 mol/L). (a) pH=2.0, (b) pH=2.4.

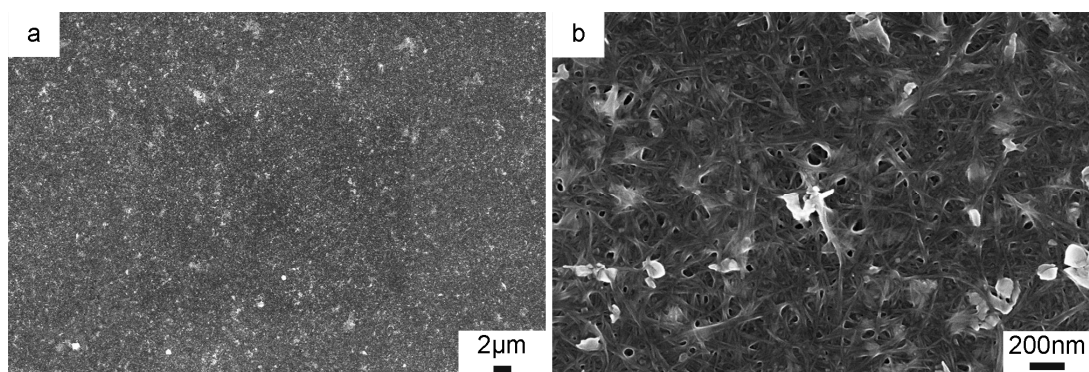


Figure S4. SEM images of the products synthesized without additive NaCl: (a) with low magnification, (b) with high magnification.