## **Electronic Supplementary Information**

# Hydrothermally synthesized WO<sub>3</sub> nanowire arrays with highly improved electrochromic performance

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### 1. Seed layer

Before hydrothermal deposition, a 20 nm-thick seed layer was formed on the substrate through a sol-gel method. WO<sub>3</sub> sol was prepared according to literature method,<sup>1</sup> then the sol was cast onto FTO-coated glass through spin-coating technology, followed by annealing at 400 °C for 30 min to form a seed layer. SEM images of the seed layer are shown in Fig. S1. The particle size is 12~26 nm, which is estimated from the plan-view SEM image.

#### 2. Specific surface area

Brunauer-Emmet-Teller (BET) surface area was studied using nitrogen adsorption at 77 K using an Autosorb-1-C analyzer (Quantachrome). The nitrogen isotherms are plotted in Fig. S2. It is found that the WO<sub>3</sub> nanowires have a BET surface area of 116.5 m<sup>2</sup> g<sup>-1</sup>. This value is comparable to the WO<sub>3</sub> nanowires prepared by microwave-assisted hydrothermal method.<sup>2</sup>

## 3. Fitting of EIS plots

According to the equivalence circuit,  $R_e$  designates the solution resistance;  $R_{sl}(i)$ and  $C_{sl}(i)$  (i=1, 2) denote the migration of lithium ions and capacity of the layer, respectively.  $R_{ct}$  and  $C_{dl}$  represent the charge-transfer resistance and a double-layer capacitance.  $Z_W$  is the Warberg impedance. These parameters can be calculated using ZView software, and the results are shown in Table S1. It is found that the nanowire array film shows much lower  $R_{sl}$  and  $Z_W$  than the micro-brick one, indicating that the porous and well-aligned structure is more favorable for charge transfer and  $Li^+$  ion diffusion than the compact structure, resulting in higher reactivity and reaction kinetics. Supplementary Material (ESI) for Journal of Materials Chemistry This journal is The Royal Society of Chemistry 2011



Fig. S1. SEM images of the seed layer. (a) plan-view; (b) sectional view.



Fig. S2. Nitrogen adsorption and desorption isotherms of WO<sub>3</sub> nanowires at 77 K.

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	$R_e/\Omega$	$R_{sl}(1)/\Omega$	$R_{sl}(2)/\Omega$	$R_{ct}/\Omega$	$Z_W /S s^{1/2} cm^{-2}$
Nanowire array film	15.6	1135	68.10	0.008	2.63×10 <sup>-5</sup>
Micro-brick film	35.8	4802	536.6	0.010	1.04×10 <sup>-4</sup>

Table S1. Fitting parameters of EIS plots

## References

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