Supporting Information for

High-Performance Flexible Lithium-Ion Electrodes Based on Robust Network Architecture

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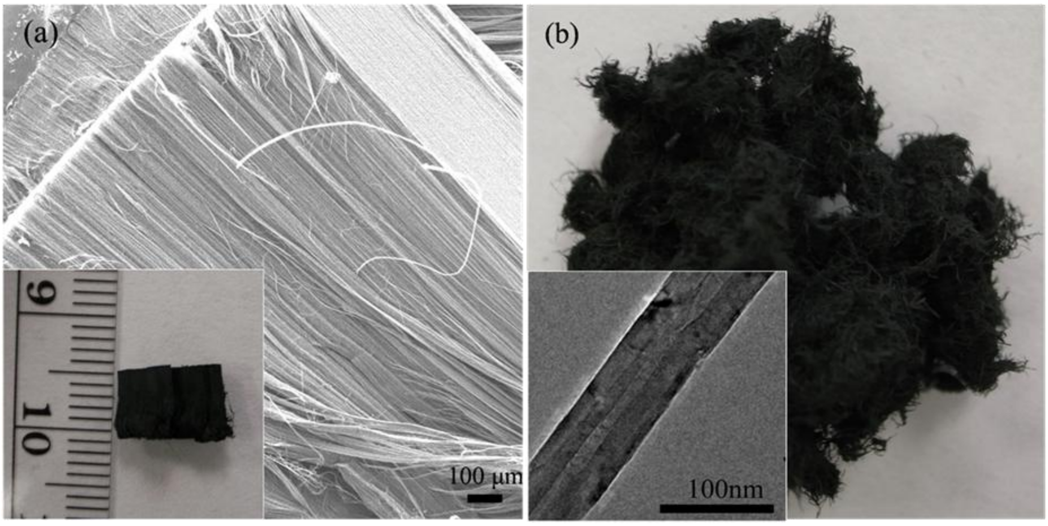

Figure S1. (a) SEM image and digital photograph (inset) of pristine ultra-long CNT arrays. (b) Digital photograph of ultra-long CNT aerogels from gas sheering; inset shows a TEM image of a single CNT.

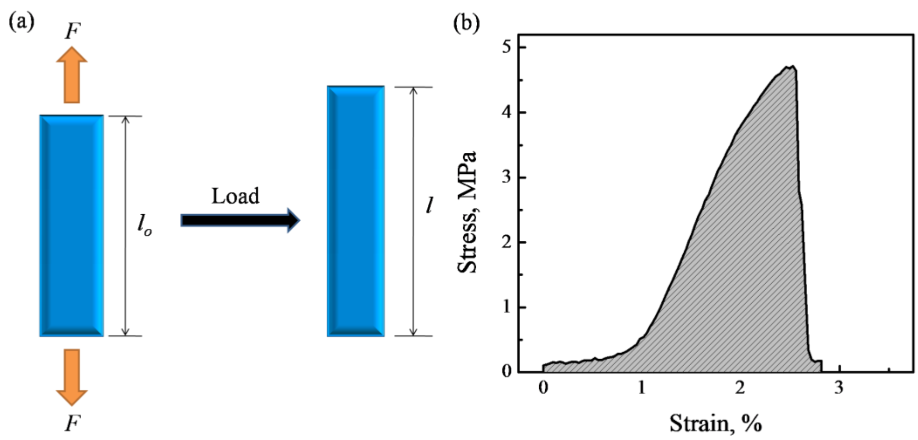

Figure S2. Schematic of mechanical testing on CNT/V_2O_5 composite electrode sheets (a) and (b) toughness of CNT/V_2O_5 composite electrodes.

As show in Figure S4 (a), the nanocomposite electrode will be stretched when a load is applied. The mechanical properties can be obtained by $\sigma = \frac{F}{S}, MPa$ (stress) and $\varepsilon = \frac{l - l_o}{l_o} \times 100\%$ (strain), where F is the load, S is the cross-section area of the electorde; l_o is the initial length of the electrode between the load, and l is the length of the electrode under tension. After the mechanical test, we can get the stress-strain curves as Figure S4 (b). Then the toughness, which is the work needed to break the film electrode, can be obtained based on integral area under stress-strain curves. Take the 25% CNT/V_2O_5 as an example, the area under stress-strain curves is $5.1 \times \frac{F}{mm \cdot mm} \times \frac{mm}{mm} \times \frac{1}{100}$, which gives a toughness of 5.1×10^4 J m^{-3}.

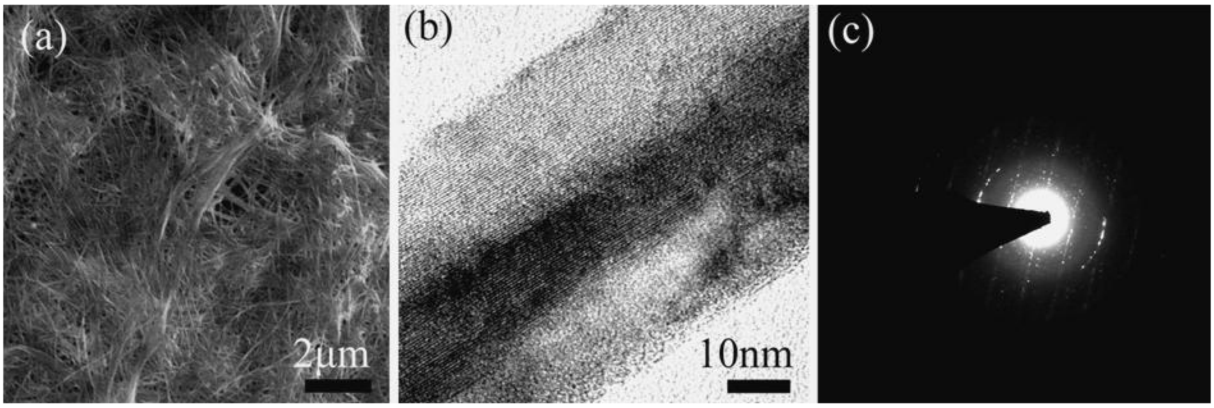

Figure S3. (a) SEM image of a film made from pure V_2O_5 nanowires synthesized without using CNTs; TEM image (b) and SAED (c) of a single V_2O_5 nanowire.

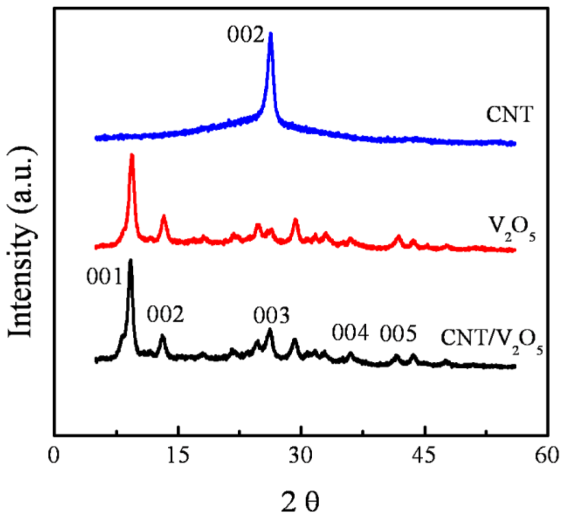

Figure S4. XRD patterns of the CNTs, V_2O_5 nanowires and CNT/V_2O_5 nanocomposite (25 wt-% CNTs).

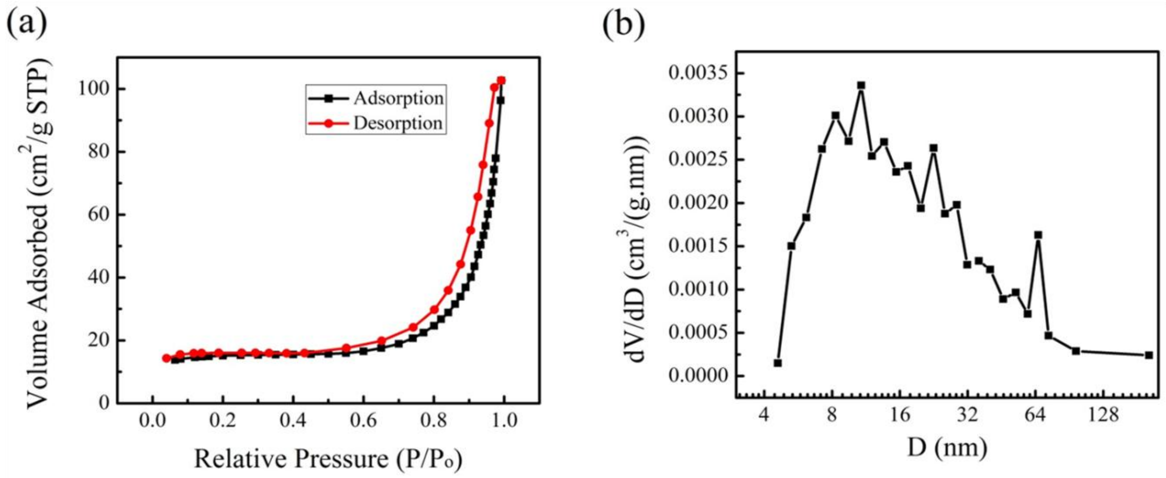

Figure S5. Nitrogen sorption isotherms (a) and pore size distribution (b) of CNT/V_2O_5 nanocomposite electrode containing 25 wt-% of CNTs.

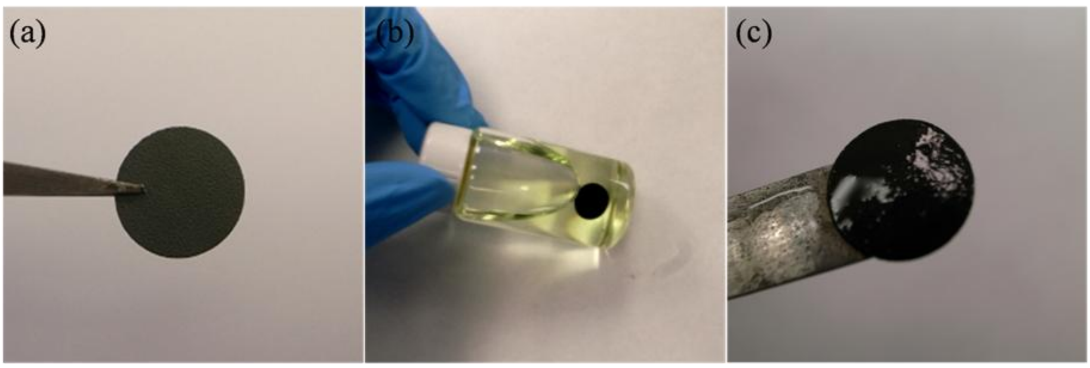

Figure S6. (a) A small disc-shape CNT/V_2O_5 nanocomposite electrode with 25 wt-% of CNTs. (b) The electrode was soaked in 37 wt-% HCl. The light-yellow color indicates the dissolution of V_2O_5 in the acid. (c) Digital photograph of the free-standing CNT sheets after dissolving V_2O_5 nanowires, maintaining its structure integrity.

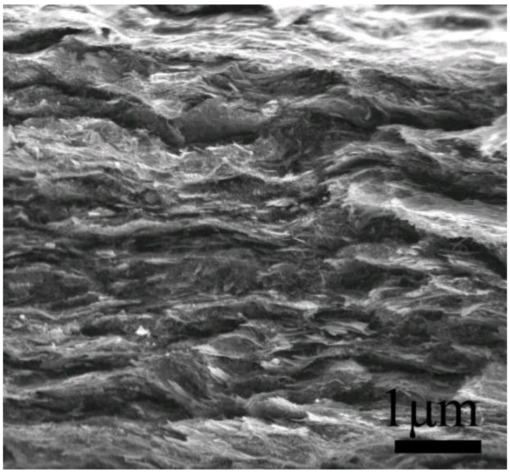

Figure S7. The cross-section SEM image of a CNT/V_2O_5 composite made from short CNTs (25 wt-%) under the same synthetic condition.

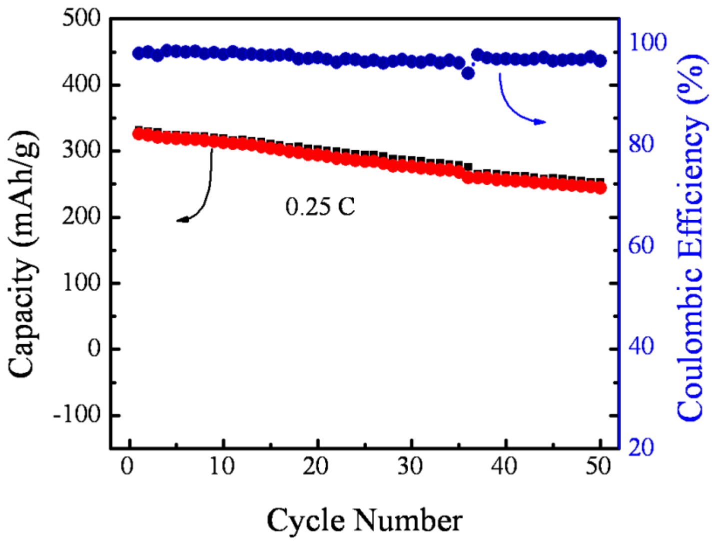

Figure S8. The cycling stability of a CNT/V_2O_5 composite electrode at low current density of 0.25C.

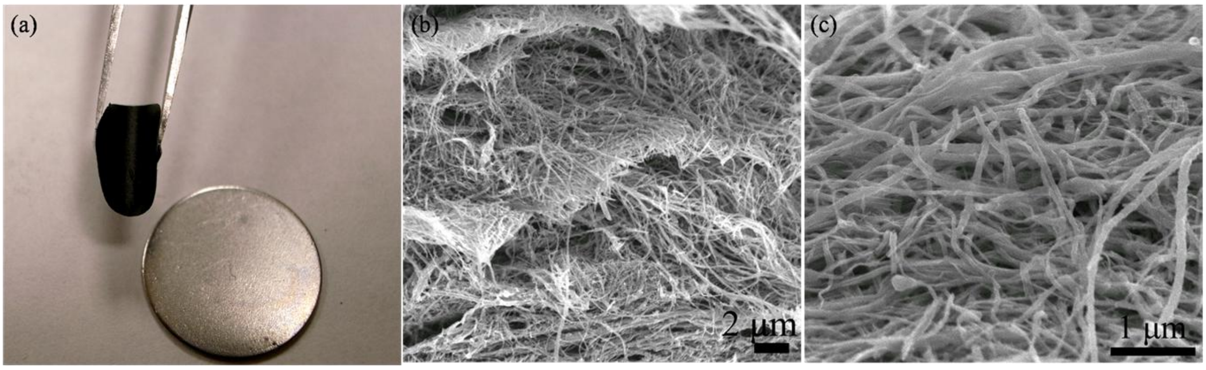

Figure S9. Digital photograph (a) and cross-section SEM images (b and c) of a flexible V_2O_5/CNT electrode after lithilation.