Supporting Information

Facile Synthesis of Graphene Supported Ultralong TiO$_2$
Nanofibers from the Commercial Titania for High Performance Lithium-Ion Batteries

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After the hydrothermal reaction and the followed acid wash process, the commercial TiO$_2$ particles transform to H$_2$Ti$_3$O$_7$. The addition of GO worked as the substrate to nucleation of the Ti-precursor. The obtained XRD pattern of TiO$_2$ nanofibers can be attributed to anatase TiO$_2$ (JCPDS 21-1272).

**Fig. S1** XRD pattern of the pristine TiO$_2$ nanofibers and its precursor.
Fig. S2 TGA curve of the as-prepared G- UTNF nanocomposite.

The weight percentage of graphene in the G- UTNF was estimated using a thermogravimetric analysis (TGA) at a heating rate of 20 °C min⁻¹ from room temperature to 700 °C under airflow. The weight loss between 300 °C and 500 °C is ascribed to the burning of graphene. The total graphene content is about 13.5 wt%.
Fig. S3 N$_2$ adsorption and desorption isotherm curves and pore size distributions (the inset) of the G- UTNF and pristine TiO$_2$ nanofibers.

Fig. S3 shows the N$_2$ adsorption-desorption isotherm curves of the G- UTNF and TiO$_2$ nanofibers by a multi-point Brunauer–Emmett–Teller (BET) method. The G-UTNF has a specific surface area of 185 m$^2$ g$^{-1}$, which is higher than that of TiO$_2$ nanofibers (125 m$^2$ g$^{-1}$). The pore size distributions were calculated from the desorption branch of the N$_2$ adsorption-desorption isotherm curves on the basis of the Barrett–Joyner–Halenda (BJH) model. The calculated average pore size for G- UTNF and TiO$_2$ nanofibers (Fig. S3 inset) were 15.5 and 13.1 nm, respectively. The total pore volume of G- UTNF and TiO$_2$ nanofibers were found to be 1.515 and 0.376 cm$^3$ g$^{-1}$, respectively.
The interplanar distance between adjacent lattice planes is 0.228 nm, which corresponds to the (200) plane of rutile TiO$_2$ crystal.
**Fig. S5** Cycling performance of the G-UTNF electrode and TiO$_2$ nanofibers electrode at 5 C.

Figure S5 shows the cycling performance at high current rate of 5 C of the G-UTNF electrode, and the TiO$_2$ nanofibers electrode. It can be clearly seen that the charge capacities of G-UTNF electrode are much higher than that of TiO$_2$ nanofibers electrode. Both of them are demonstrated with excellent cycling stability.