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Supporting Information

Facile Synthesis of Graphene Supported Ultralong TiO_2 Nanofibers from the Commercial Titania for High Performance Lithium-Ion Batteries

Guifang Gu [a] , *Jianli Cheng* [a,b,]* , *Xiaodong Li* [a] , *Wei Ni* [a], *Qun Guan* [a],*Guoxing Qu* [a] , *Bin Wang* [a] *

[a] *Institute of Chemical Materials, China Academy of Engineering Physics, Mianyang 621900, Sichuan, P.R. China.*

[b] *State Key Laboratory of Molecular Engineering of Polymers (Fudan University)*

*Address correspondence to binwang@caep.cn; edward.bwang@gmail.com; Fax: (+86)816-2544 426.

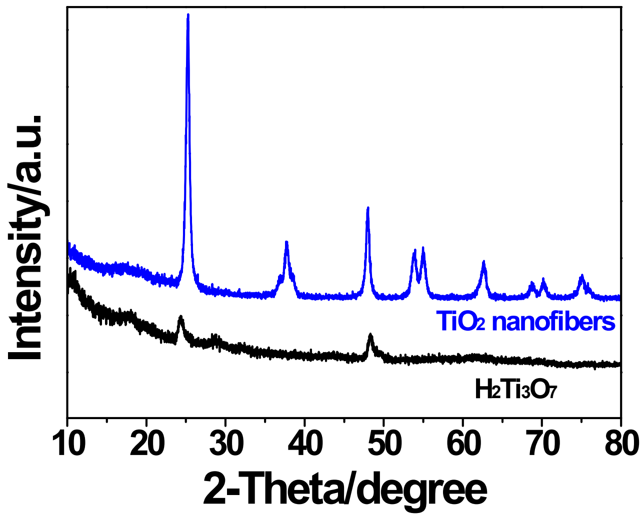

Fig. S1 XRD pattern of the pristine TiO_2 nanofibers and its precursor.

After the hydrothermal reaction and the followed acid wash process, the commercial TiO_2 particles transform to $H_2Ti_3O_7$. 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).

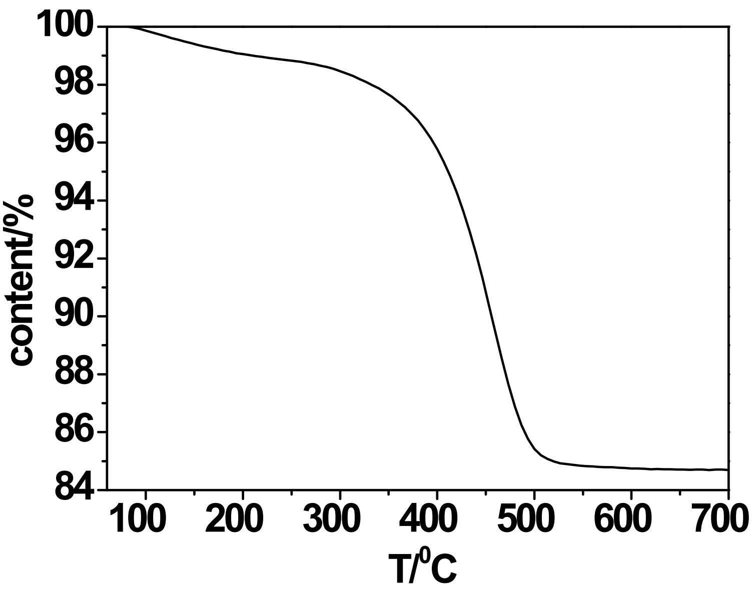

Fig. S2 TGA curve of the as-prepared G- UTNF nanocomposite.

The weight percentage of graphene in the G- UTNF was estimated using a thermogravimetric analysis (TGA) at a heating rate of 20 ^{o}C min^{-1} from room temperature to 700 ^{o}C under airflow. The weight loss between 300 ^{o}C and 500 ^{o}C is ascribed to the burning of graphene. The total graphene content is about 13.5 wt%.

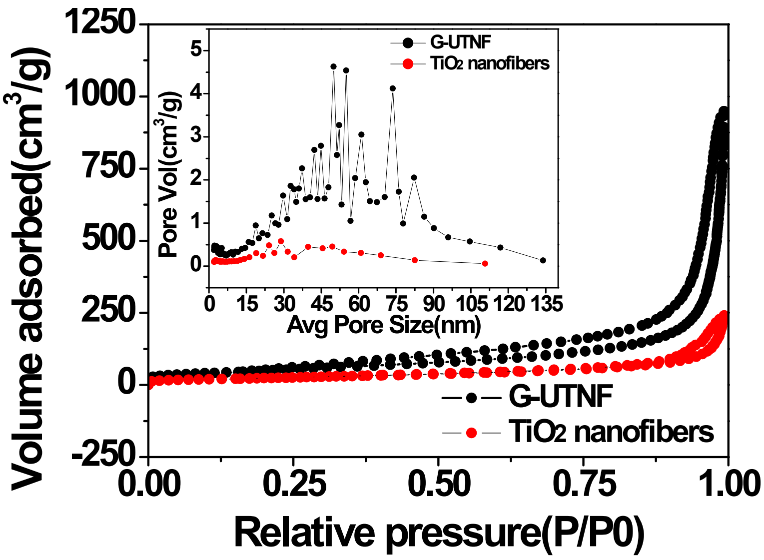

Fig. S3 N_2 adsorption and desorption isotherm curves and pore size distributions (the inset) of the G- UTNF and pristine TiO_2 nanofibers.

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.

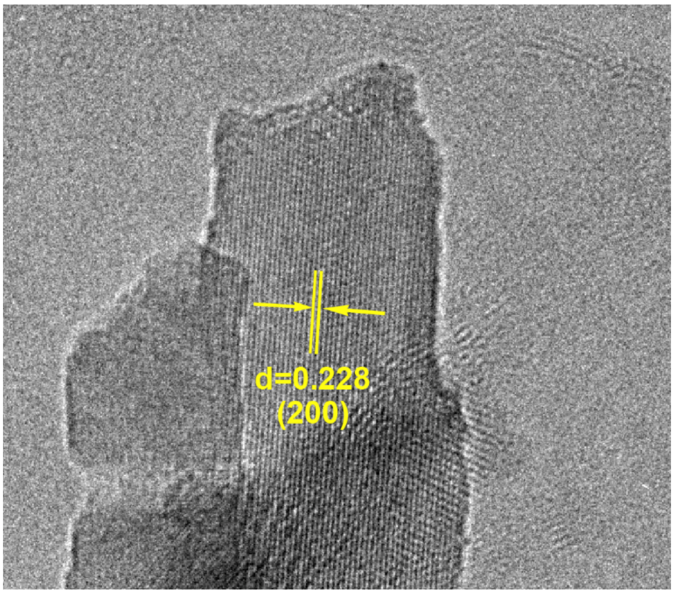

Fig. S4 HR-TEM image of G- UTNF.

The interplanar distance between adjacent lattice planes is 0.228 nm, which corresponds to the (200) plane of rutile TiO_2 crystal.

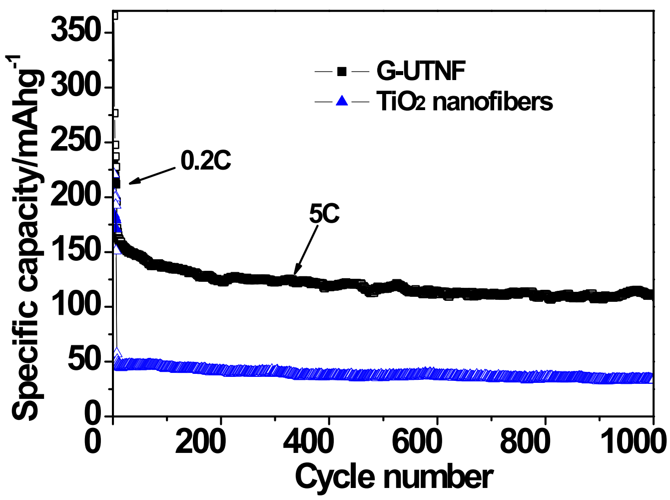

Fig. S5 Cycling performance of the G- UTNF electrode and TiO_2 nanofibers electrode at 5 C.

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.