Supplementary information

Construction of Sheet/Belt Hybrid Nanostructures by One-Dimensional Mesoporous TiO_2(B) Nanobelts and Graphene Sheets for Advanced Lithium-Ion Batteries

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Materials Characterization

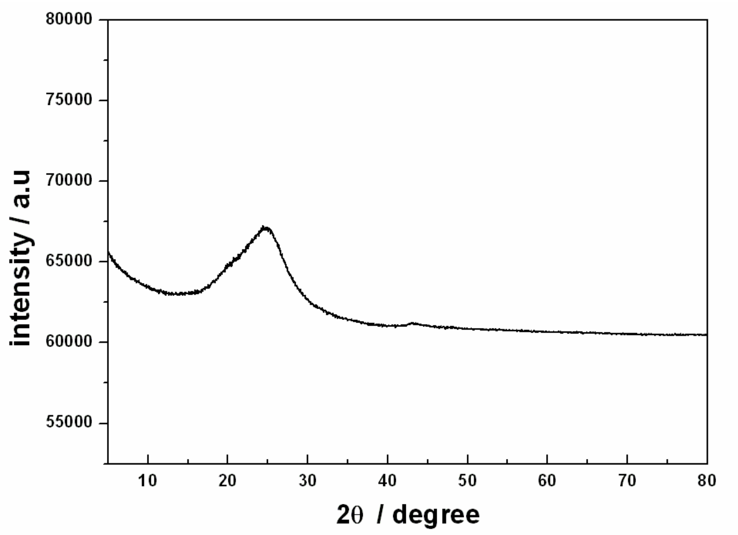

Fig. S1 XRD pattern of the graphene sheets

Fig. S1 shows the XRD pattern of the graphene sheets. It exhibits a characteristic (002) peak of graphene emerged at 26.4 ^{o}.

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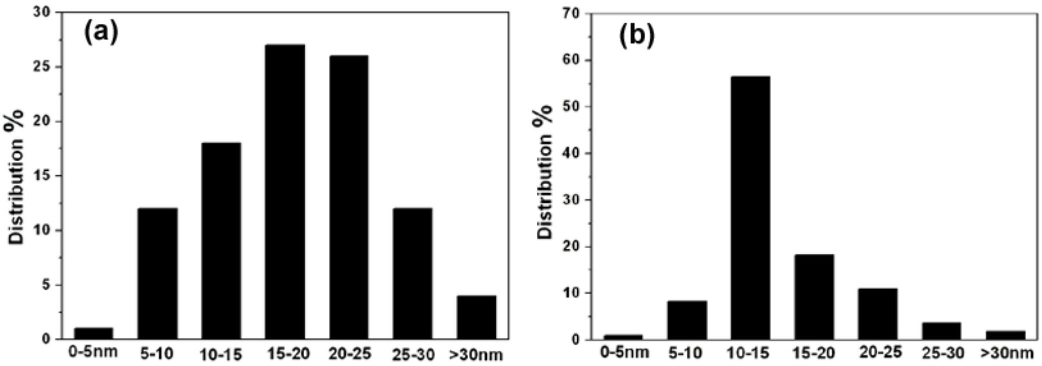

Fig. S2 Mesoporous diameter distribution in the pure TiO_2(B) nanobelts (a) and the G/TiO_2(B) hybrid (b)

Mesoporous diameter distribution of the as-prepared samples was estimated from TEM images, as shown in Fig. S2 It shows that the mesoporous diameters of the pure TiO_2(B) nanobelts mainly distribute between 10–30nm.

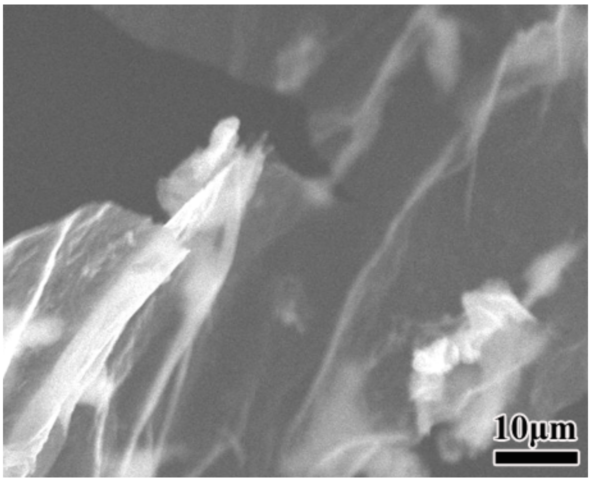

Fig. S3 SEM images of the graphene sheets

Fig. S3 presents SEM images of the graphene sheets. It shows the paper-like nanosheet morphology of graphene with the slightly folded edges.

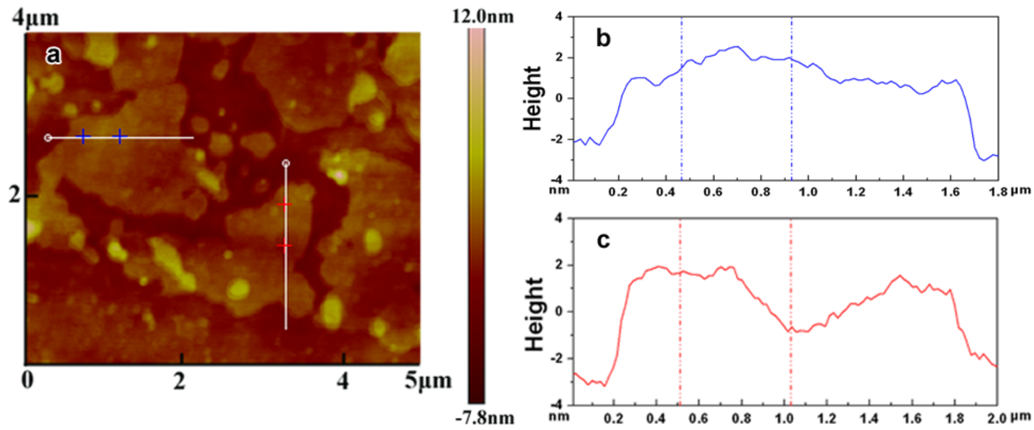

Fig. S4 (a) AFM images of a 4μm × 5μm scan of graphene sheets overlaid onto a silicon surface. (b, c) Two height profiles acquired in different locations

Fig. S4 (a) shows an AFM image of the as-made graphene sheets. It appears sheet structure. The AFM height image shown in Fig. S4 (b-c) indicates that the thickness of the graphene sheets is measured to be 4–5 nm, corresponding to 4~5layers.

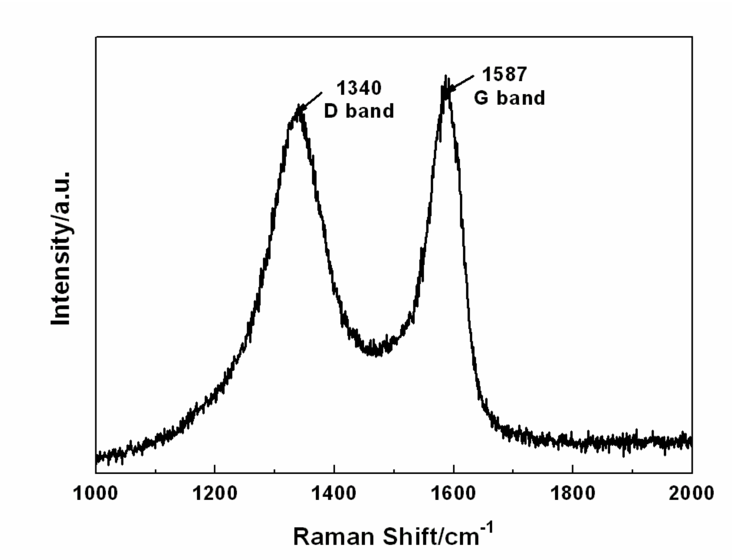

Fig. S5 Raman spectra of G/TiO_2(B) hybrid nanostructures

Fig. S5 shows the Raman spectra of G/TiO_2(B) hybrid nanostructure. Two intense broad bands located at 1340 cm^{-1} and 1587 cm^{-1} are attributedto the A_{1g} vibration mode of the disordered carbon (D-band) and the E_{2g} vibration mode of the ordered graphitic carbon (G-band) , respectively. The I_D/I_G intensity ratio represents the disordering degree of graphene. A small value of I_D/I_G ratio (*ca.* 0.84) reveals decreased level of disorder, which is beneficial to enhance the electronic conductivity.

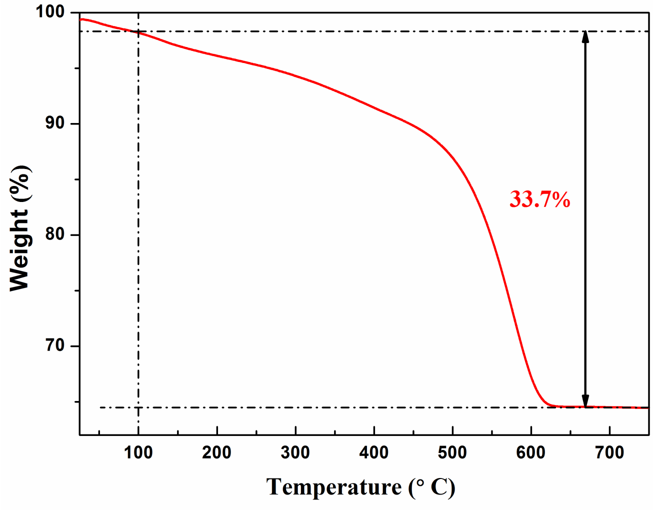

Fig. S6 Thermo-gravimetric analysis (TGA) curve of the G/TiO_2(B) hybrid nanostructures in air

The graphene content of the as-prepared G/TiO_2(B) hybrid has been investigated by thermo-gravimetric analysis (TGA), as presented in Fig. S6. It can be calculated that the weight fraction of graphene in the resulting hybrids is about 33.7%.