Supplementary information

Construction of Sheet/Belt Hybrid Nanostructures by One-Dimensional Mesoporous TiO₂(B) Nanobelts and Graphene Sheets for Advanced Lithium-Ion Batteries

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Materials Characterization

![Graphene XRD pattern](image)

**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°.

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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 4~5 layers.

**Fig. S5** Raman spectra of G/TiO2(B) hybrid nanostructures

Fig. S5 shows the Raman spectra of G/TiO2(B) hybrid nanostructure. Two intense broad bands located at 1340 cm⁻¹ and 1587 cm⁻¹ are attributed to the A₁g vibration mode of the disordered carbon (D-band) and the E₂g 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.

![Thermo-gravimetric analysis (TGA) curve of the G/TiO$_2$(B) hybrid nanostructures in air](image)

**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%.