Supplementary Information for

Low-temperature (400 °C) coating few-layer graphene on porous $Li_4Ti_5O_{12}$ via $C_{28}H_{16}Br_2$ pyrolysis for lithium-ion batteries

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Experimental section

The as-prepared $Li_4Ti_5O_{12}$ was added to the $C_{28}H_{16}Br_2$ (at a $Li_4Ti_5O_{12}$: $C_{28}H_{16}Br_2$ ratio of 90: 10) tetrahydrofuran solution, and the slurries were stirred vigorously. After the evaporation of the tetrahydrofuran, the mixture of $Li_4Ti_5O_{12}$ and $C_{28}H_{16}Br_2$ was heat-treated at 200 °C for 30 min and then calcined at 400 °C for several hours in an argon atmosphere. The obtained sample was designated as $Li_4Ti_5O_{12}$/graphene.

The structures of the materials were characterized using an X'Pert Pro MPD X-ray diffractometer (Philips, Netherlands) with Cu Kα radiation (1.5405 Å). The morphologies of the materials were observed using a scanning electron microscope (Hitachi S-4800). HRTEM was performed using an F20 HRTEM equipped with an energy dispersive X-ray analyzer (Horiba EMAX). The Raman spectra were obtained on a Renishaw inVia micro-Raman spectroscopy system. The TG/DTA curve of the $Li_4Ti_5O_{12}$/graphene sample was obtained using a Diamond TG/DTA thermoanalyzer.

The electrodes were prepared with active materials, carbon black, and poly(vinyl difluoride) at a weight ratio of 80:10:10. The slurry was cast on pure Al foil and dried at 100 °C in vacuum for 10 h. The coil cells CR2032 were assembled with pure lithium foil as counter electrode, a glass fiber as separator, and 1 M $LiPF_6$ EC: DMC (1:1) as electrolyte in an argon filled glove box. The discharge and charge measurements were performed on a Land BT2000 battery test system (Wuhan, P. R. China). The mass loading of the electrodes is around 3.1mg cm^{-2}. The Li storage tests for the as-prepared $Li_4Ti_5O_{12}$ and $Li_4Ti_5O_{12}$/graphene samples were performed at a voltage range of 1.0–2.2 V. For the AC impedance measurement, the amplitude of the AC signal was 5 mV and the frequencies were swept from 1 MHz to 10 mHz using the electrochemical workstation Zennrum.

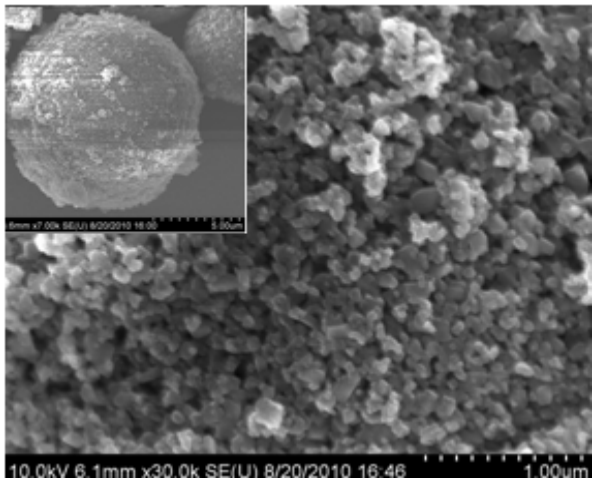

Figure S1 SEM images of the as-prepared $Li_4Ti_5O_{12}$ sample.

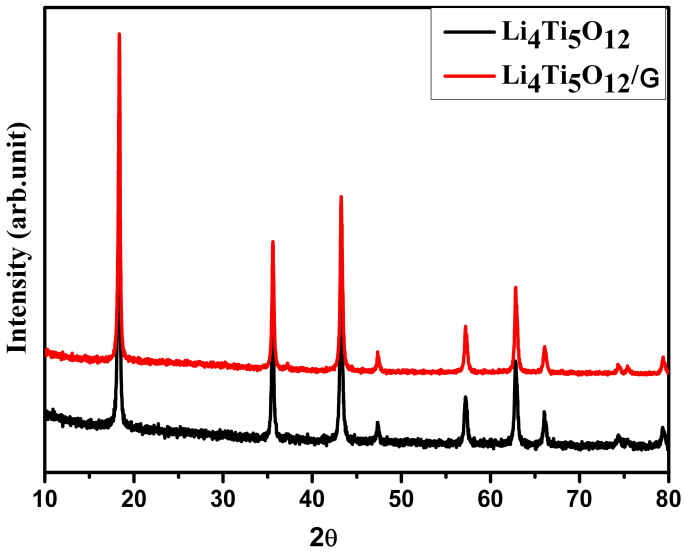

Figure S2 XRD patterns of the as-prepared $Li_4Ti_5O_{12}$ and $Li_4Ti_5O_{12}$/graphene samples.

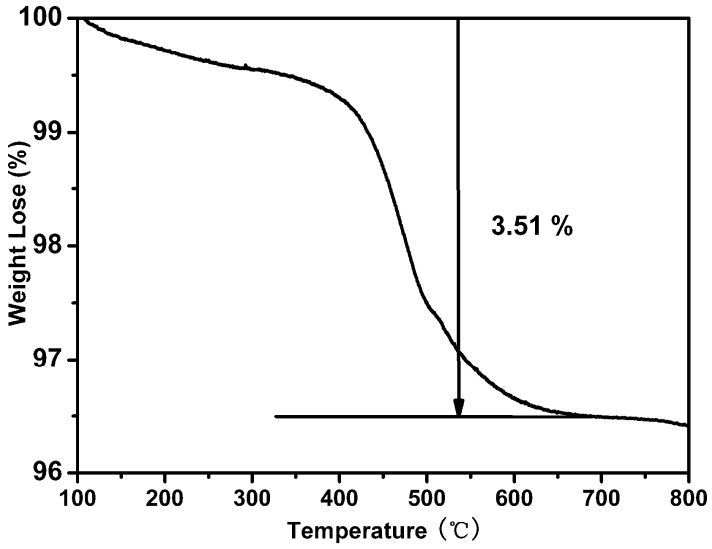

Figure S3 TG curve of the $Li_4Ti_5O_{12}$/graphene sample with carbon content of 3.51 wt.%.

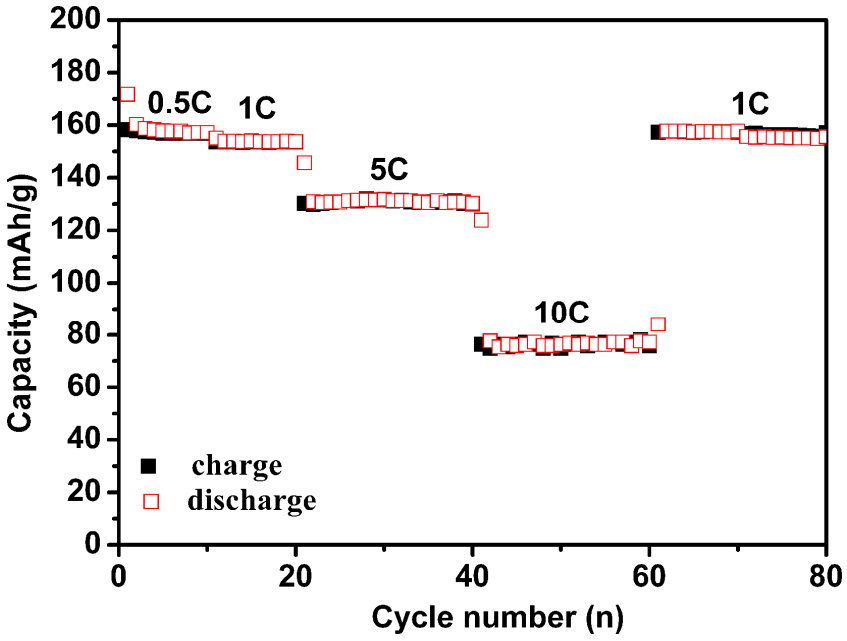

Figure S4 Discharge and charge capacities of the $Li_4Ti_5O_{12}$/graphene sample with carbon content of 3.51 wt.% at different current rates.

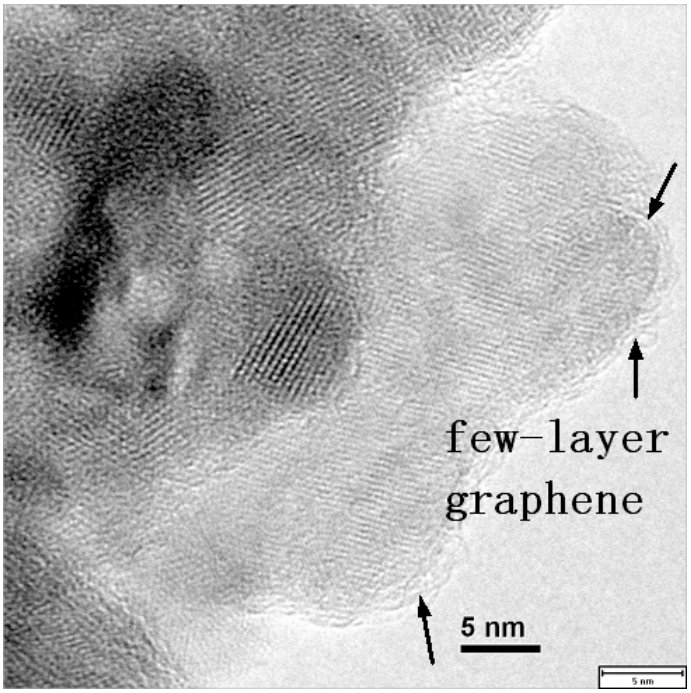

Figure S5 HRTEM image of the Li_2MnO_3/graphene sample.