Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A
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Supplementary Information

Conformal N-doped carbon on nanoporous TiO_2 spheres as a high-performance anode material for lithium-ion batteries

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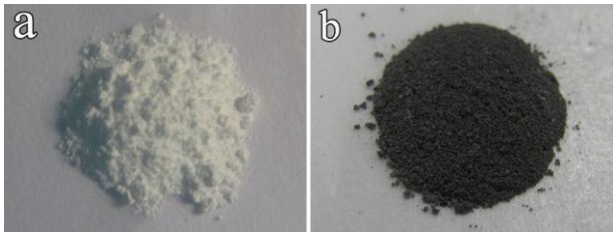

Fig. S1 Digital photos for the powder samples. (a) nanoporous TiO_2 spheres; (b) TiO_2@NC nanocomposite.

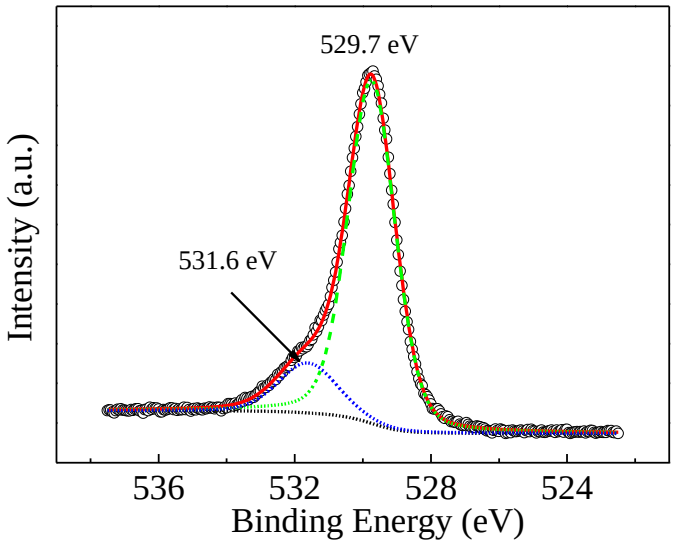

Fig. S2 High-resolution XPS O 1s spectra for the TiO_2@NC nanocomposite.

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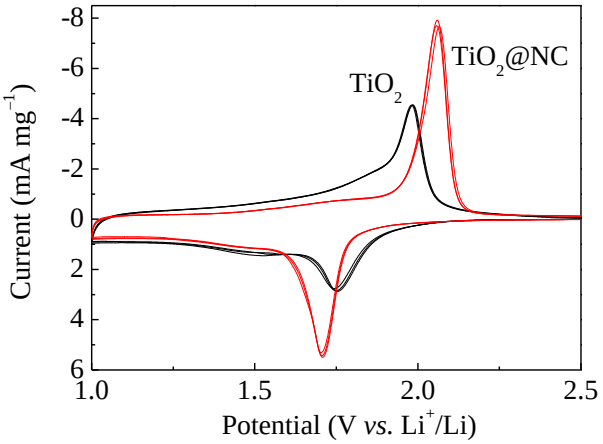

Fig. S3 CV curves for the nanoporous TiO_2 spheres and the TiO_2@NC nanocomposite at a scan rate of 0.2 mV s^{-1} (from the second to the forth).

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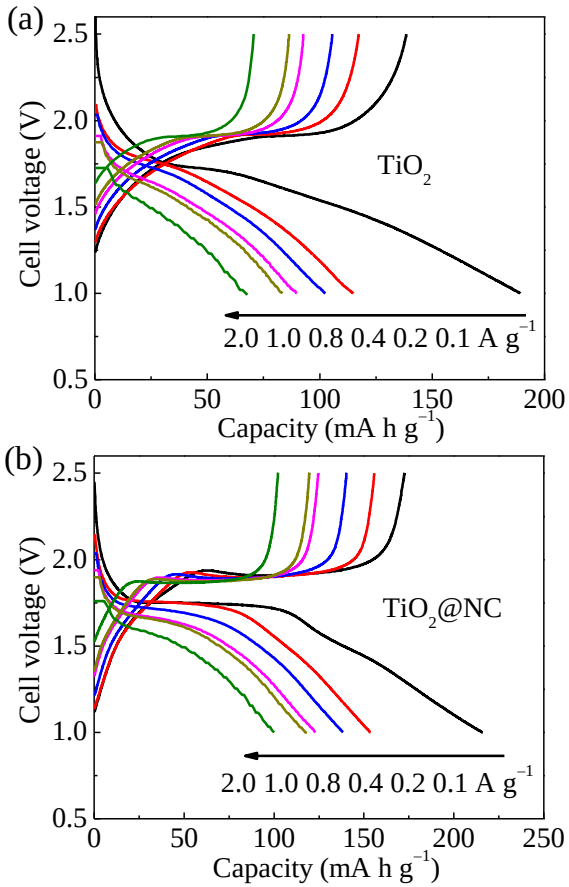

Fig. S4 Charge and discharge curves for (a) the nanoporous TiO_2 spheres and (b) the TiO_2@NC nanocomposite at current densities varying from 0.1 to 2.0 A g^{-1} each for 10 cycles.

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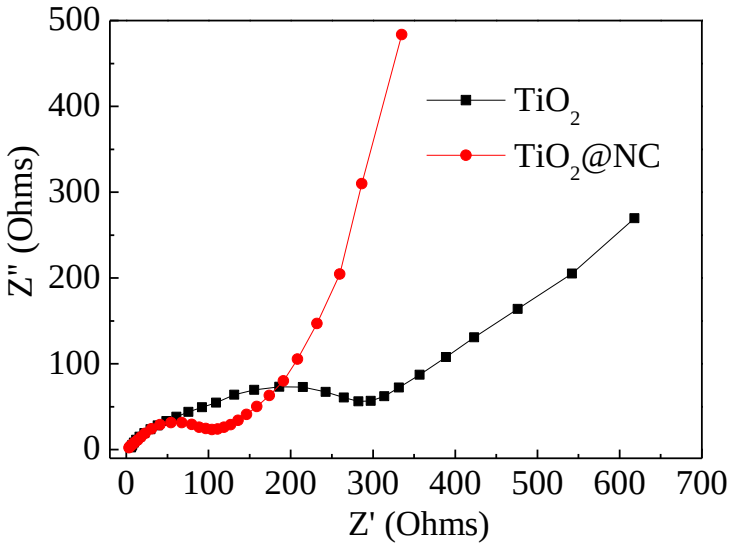

Fig. S5 Electrochemical impedance spectra of the electrodes made of the pure porous TiO_2 nanospheres and the as-formed TiO_2@NC hybrid.

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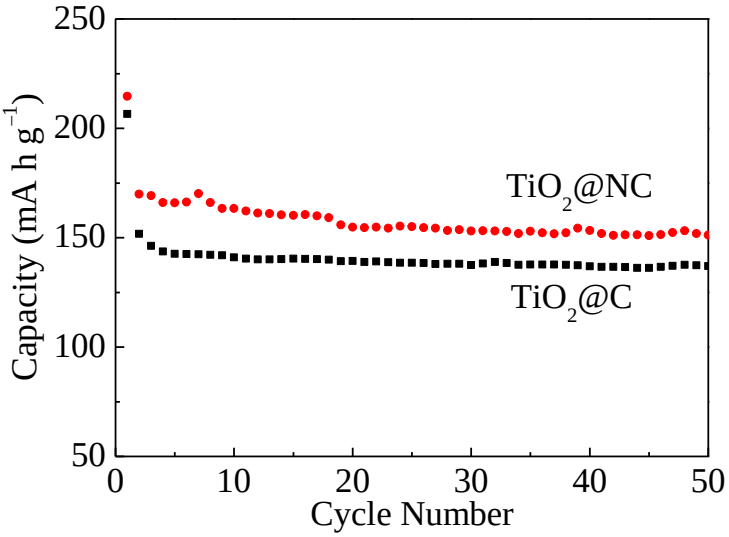

Fig. S6 Cycling performance of the TiO_2@C and TiO_2@NC electrodes at a current density of 100 mA g^{-1}.

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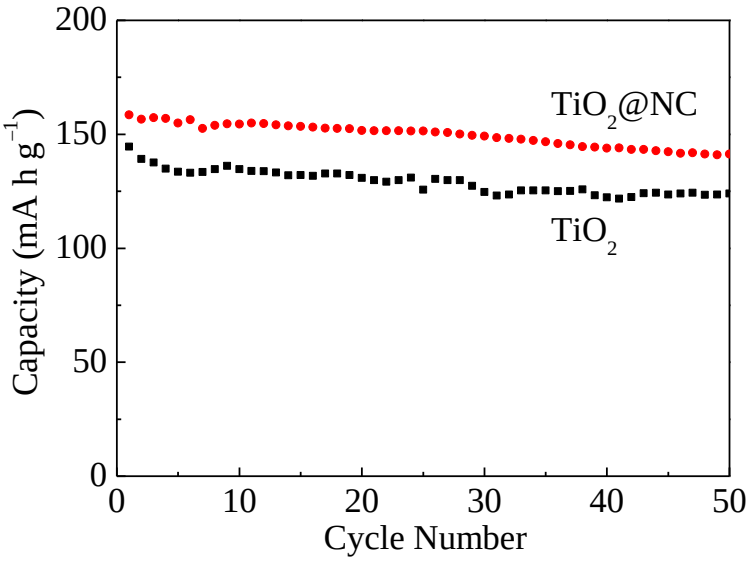

Fig. S7 Cycling performances of the nanoporous TiO_2 spheres and the TiO_2@NC nanocomposite after rate performance shown in Fig.7c.

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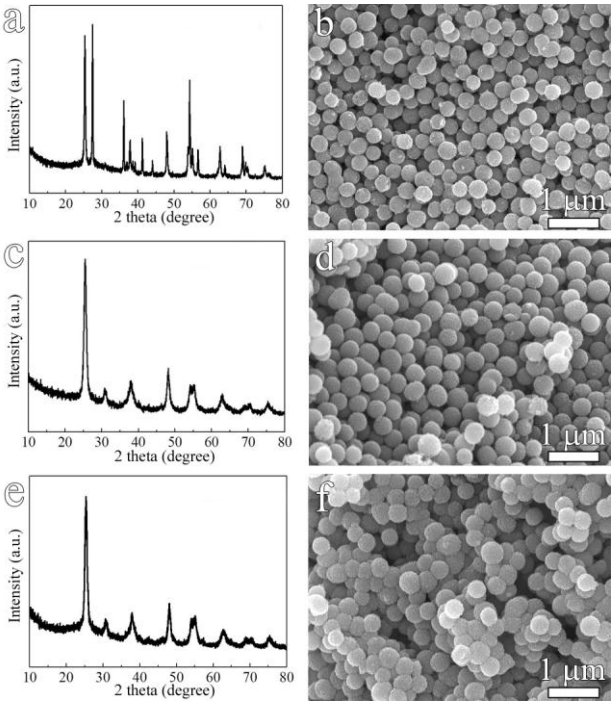

Fig. S8 XRD patterns and FESEM images of TiO_2@NC-0 (a and b), TiO_2@NC-1 (c and d), TiO_2@NC-3 (e and f).

The TiO_2@NC-0 sample without ILs is composed of anatase and rutile, the high intensity of rutile indicates its content is not just a little. However, the XRD patterns of TiO_2@NC-1 and TiO_2@NC-3 with different amount of ILs are consistent with the TiO_2@NC-2 and nanoporous TiO_2 spheres. It demonstrates that the addition of ILs had a great effect on restrainting the transformation to rutile from anatase. The morphology of TiO_2@NC-3 is relatively agglomerated than the other samples, because the adsorption ability of nanoporous TiO_2 spheres reaches the super-saturation state.

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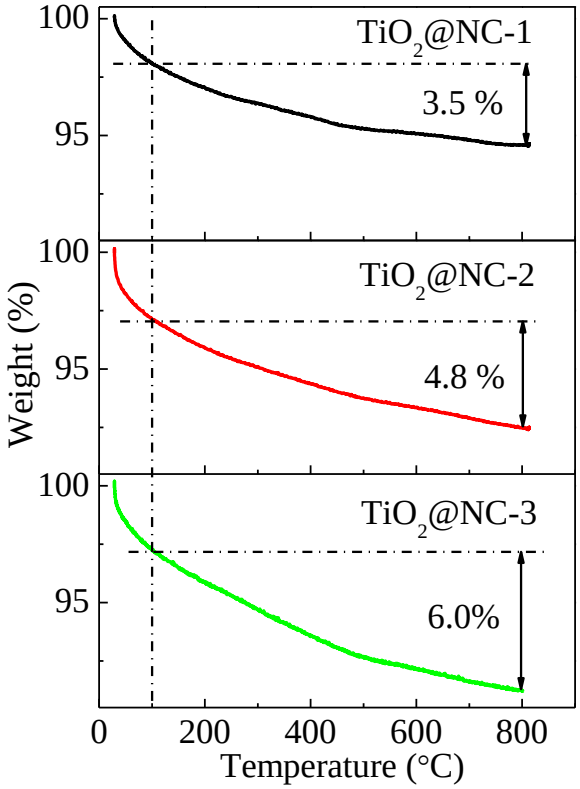

Fig. S9 TG curves of the TiO_2@NC nanocomposites at a heating rate of 10 °C min^{-1} in flowing air. The large weight loss below 400 °C in TG curves corresponds to the removal of absorbed water from the sample and the decomposition of partial carbon.

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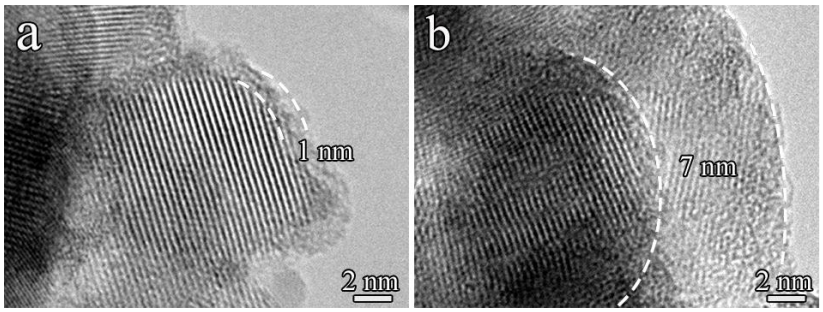

Fig. S10 HRTEM images for (a) the TiO_2@NC-1 composite and (b) the TiO_2@NC-3 composite.