Supporting Information

Improved Electrochemical Performance of Nitrogen Doped TiO_2-B Nanowires as Anode Material for Li-ion Batteries

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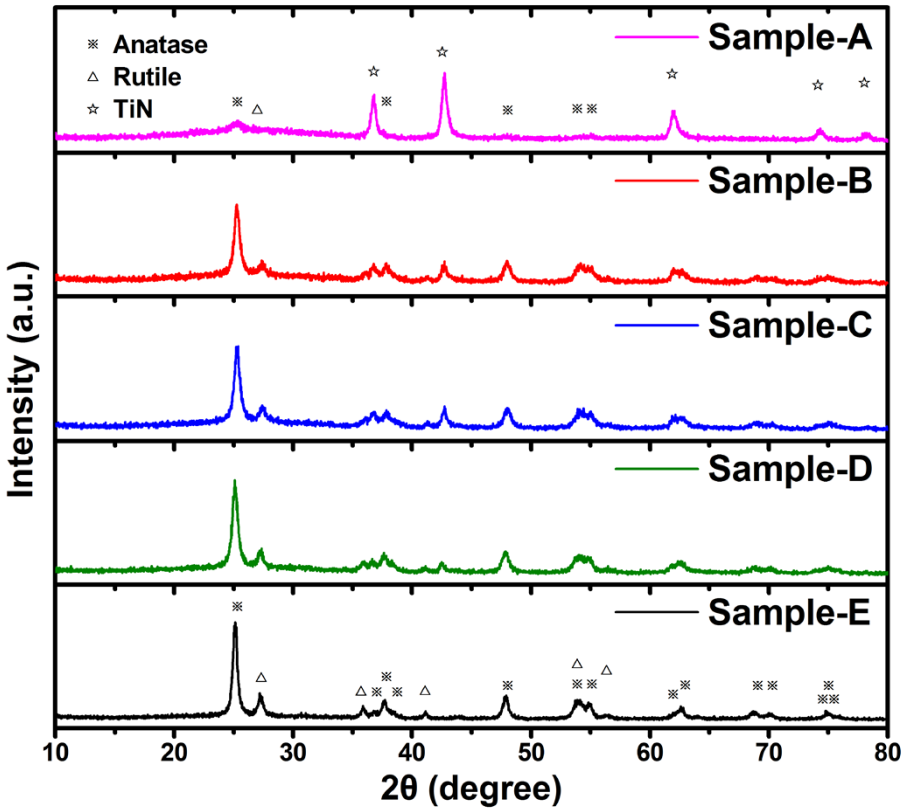

Figure S1: XRD patterns of the N-doped TiO_2-B precursors. As the first step for materials preparation, TiN nano particles were heat treated at 400 ^oC in air to obtain the precursors. X-ray diffraction shows that the precursor is a mixture of anatase, rutile and TiN due to incomplete reaction of TiN with oxygen. The amount of N in the precursors could be adjusted by changing the heat treatment time, i.e. 0, 10, 20 and 30 minute for Sample-A, B, C and D, respectively. In order to prepare pure TiO_2-B nanowires (Sample-E), the heat treatment temperature should be increased to 500 ^oC and the heating time should be elongated to 10 h.

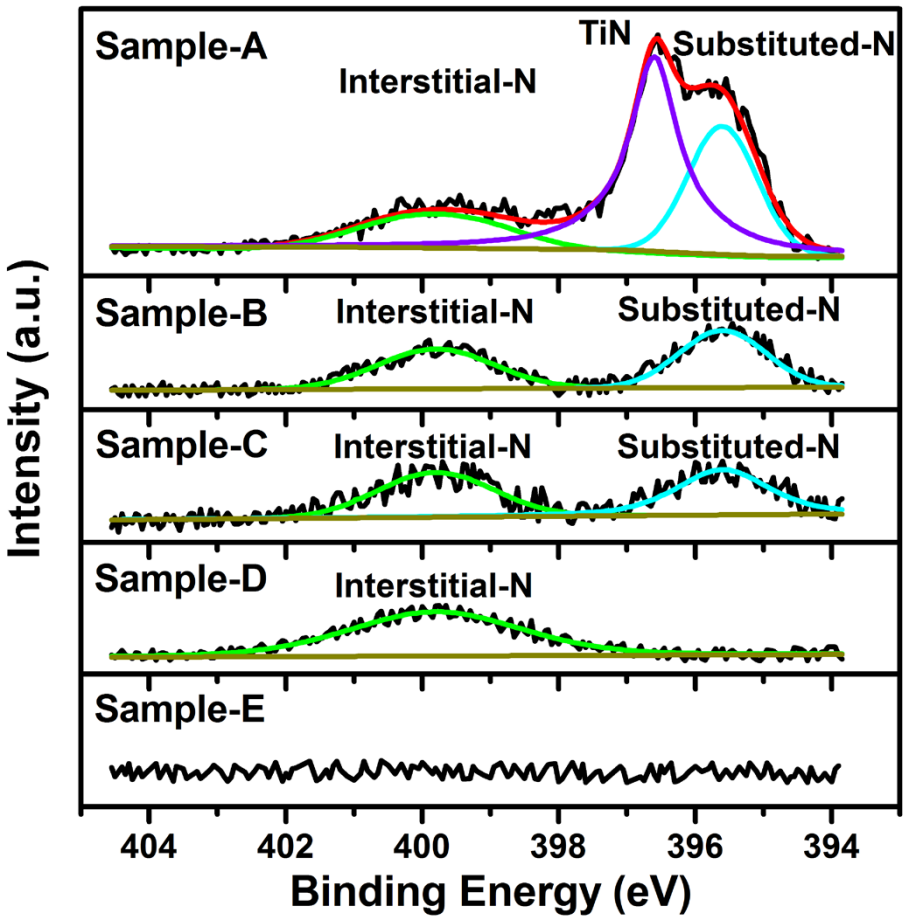

Figure S2: N 1s XPS of the N-doped TiO_2-B samples. The N 1s peaks at 399.8, 396.6 and 395.6 eV are due to the interstitial-N, TiN impurity and substituted-N, respectively. The proportions of different N species in the samples are calculated from the XPS data as displayed in Table S1. It is seen that the maximum proportion of interstitial-N in TiO_2-B is ~ 0.55 at.%. Above this value, the N dopants will substitute the oxygen atoms. In addition, the maximum substituted-N in TiO_2-B is evaluated to be ~ 1.3 at.%; otherwise, TiN impurity will be formed in the material.

Table S1. Proportions of different N species of the N-doped TiO_2-B samples.

	Interstitial-N (at.%)	TiN impurity (at.%)	Substituted-N (at.%)
Sample-A	0.56	2.37	1.33
Sample-B	0.57	0	0.72
Sample-C	0.51	0	0.50
Sample-D	0.52	0	0
Sample-E	0	0	0

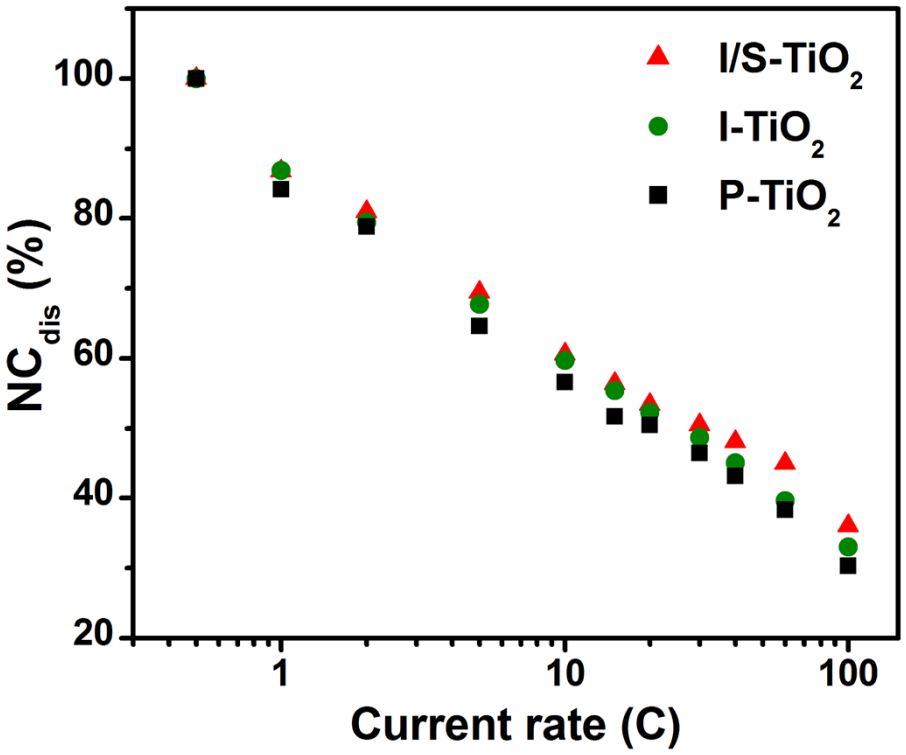

Figure S3： Normalized discharge capacities of the P-TiO_2, I-TiO_2 and I/S-TiO_2 samples at different current rates.

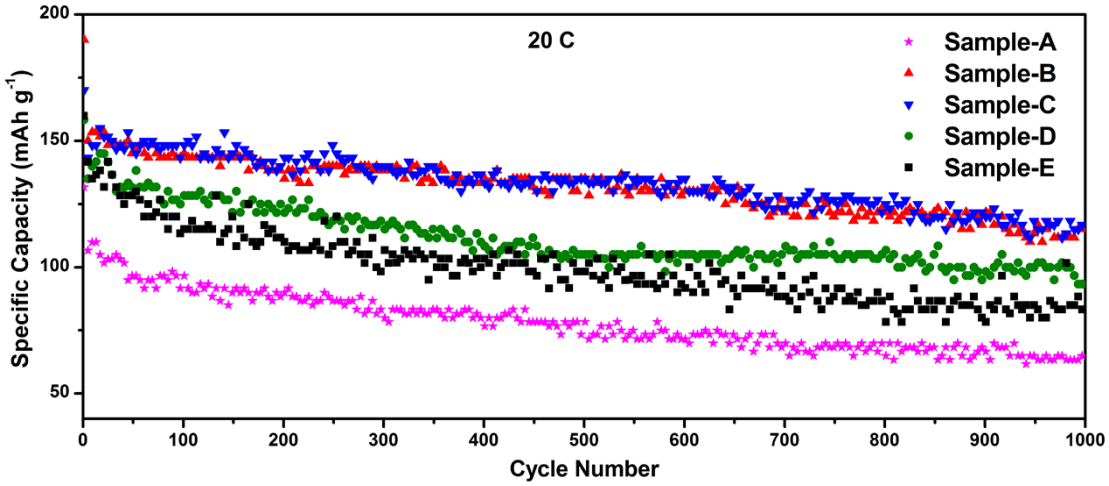

Figure S4： Cycling performance of the N-doped TiO_2-B samples at the 20 C rate.

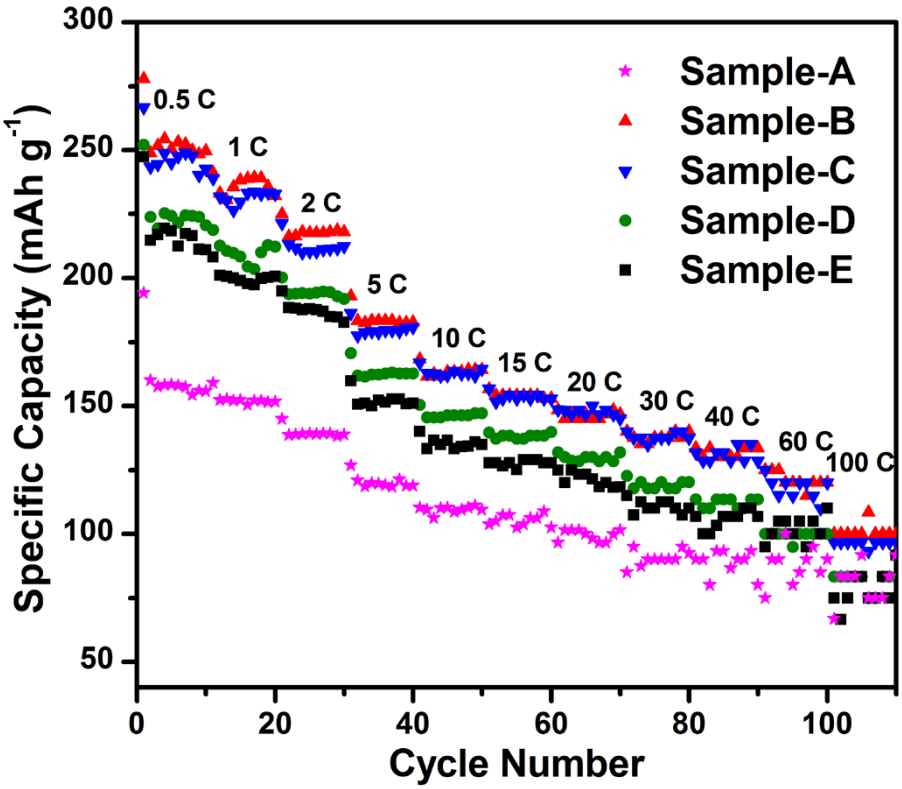

Figure S5： Rate dependent cycling performance of the N-doped TiO_2-B samples.

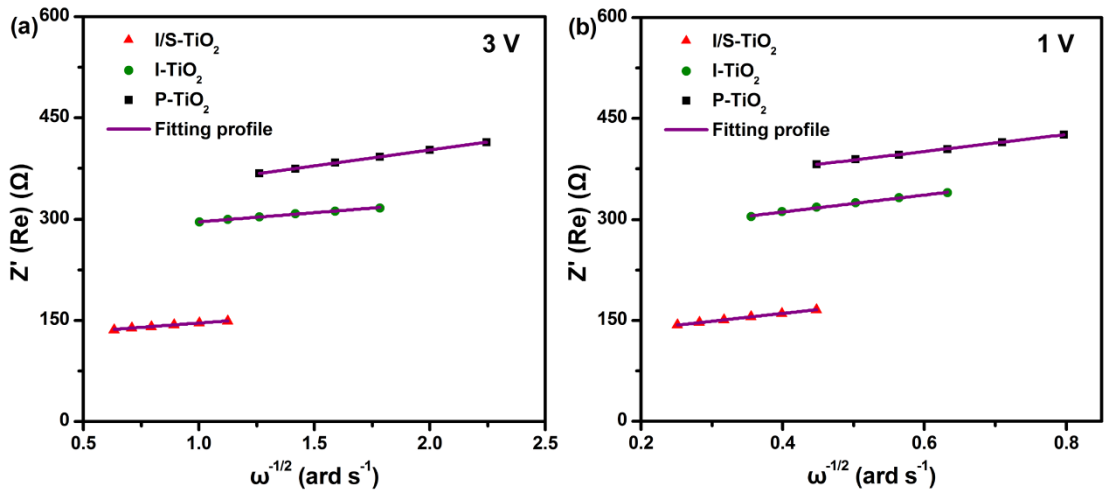

Figure S6: Linear fitting of the Z' *vs.* $\omega^{-1/2}$ plots of the P-TiO_2, I-TiO_2 and I/S-TiO_2 samples at 3.0 V (a) and 1.0 V (b) of the first discharge.

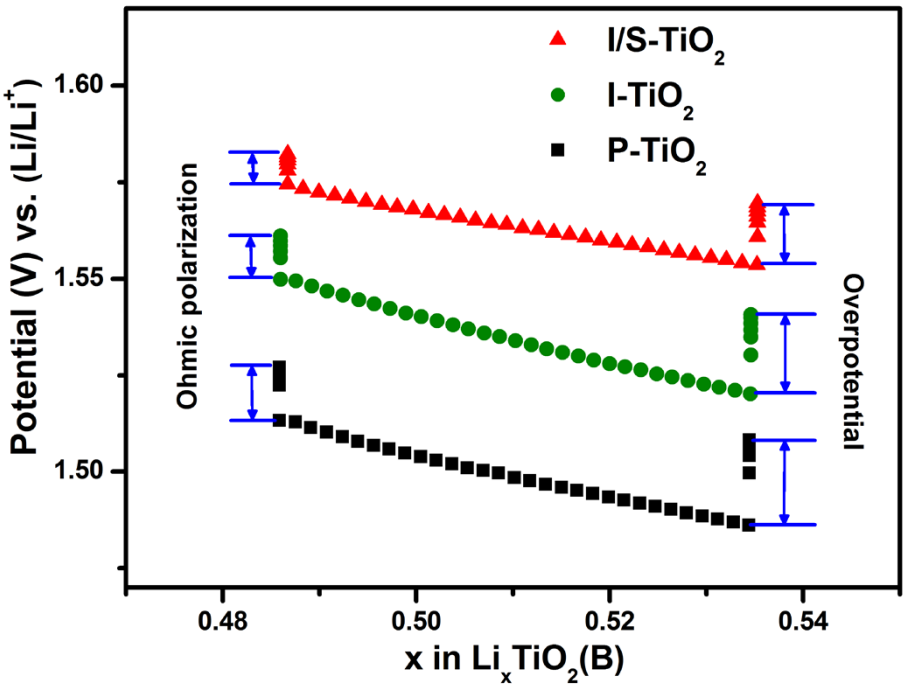

Figure S7: GITT curves of the P-TiO_2, I-TiO_2 and I/S-TiO_2 samples at x = 0.49.

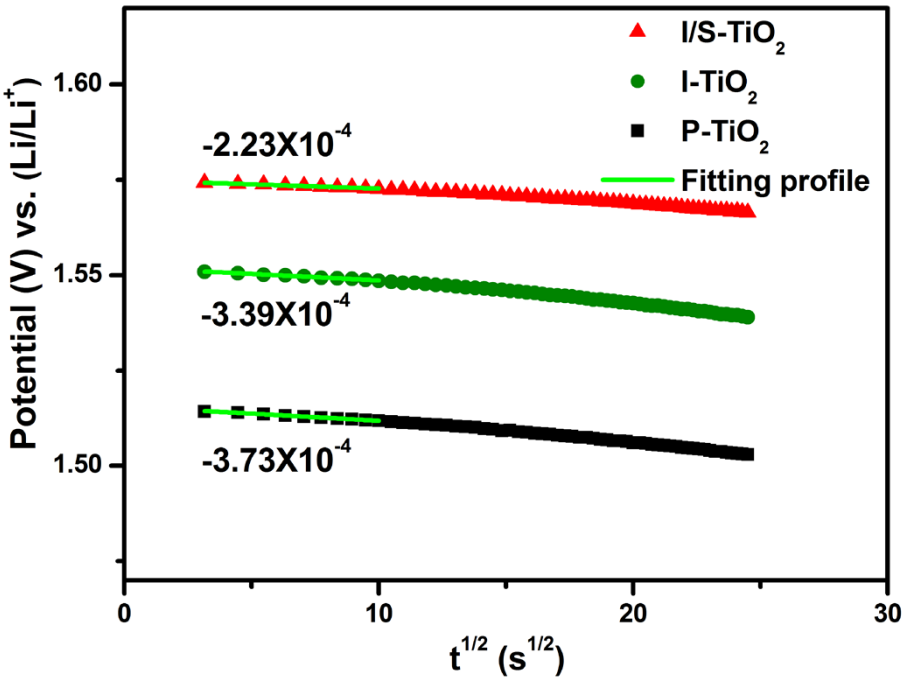

Figure S8: *E vs* $t^{1/2}$ plots of the P-TiO_2, I-TiO_2 and I/S-TiO_2 samples at x = 0.49.