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


# Supporting Information

## Oxygen deficient, carbon coated self-organized $TiO_2$ NT as anode material for Li-ion intercalation

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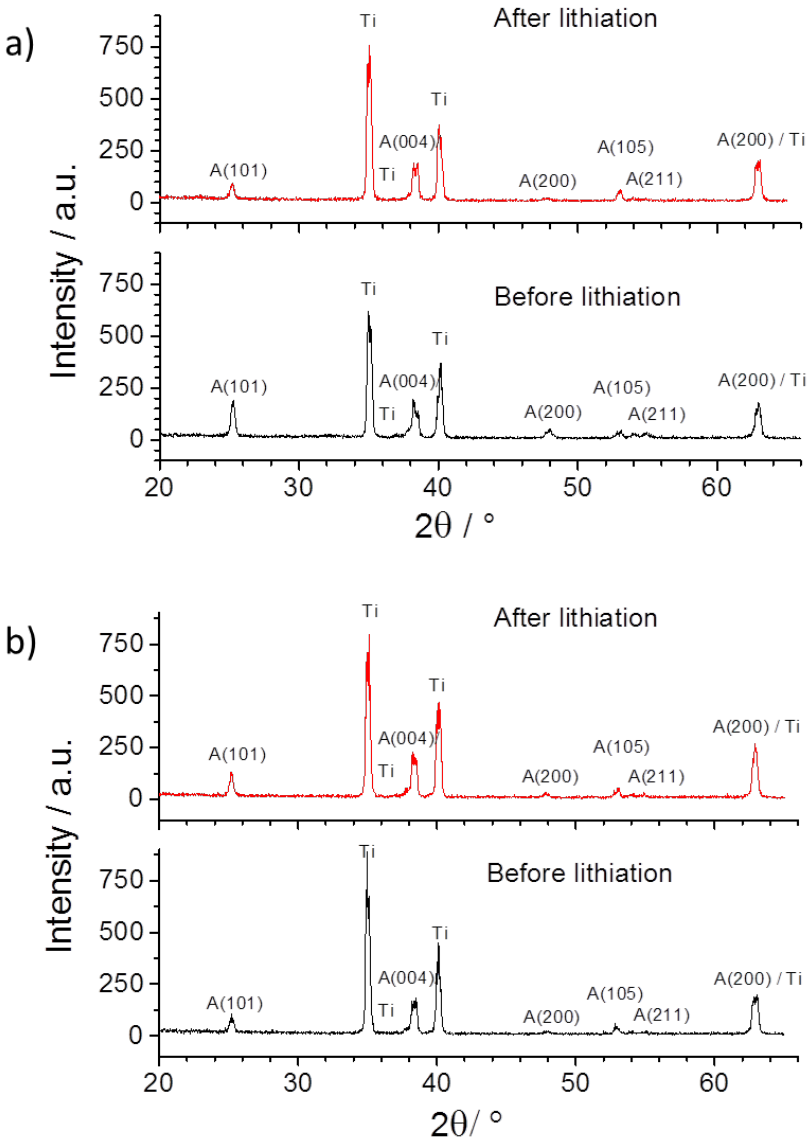


**Figure S1.** XRD spectra for $TiO_x$ (a) and $TiO_{2-x}$-C (b) NT before and after Li-intercalation showing the anatase $TiO_2$ structure of the annealed NT.

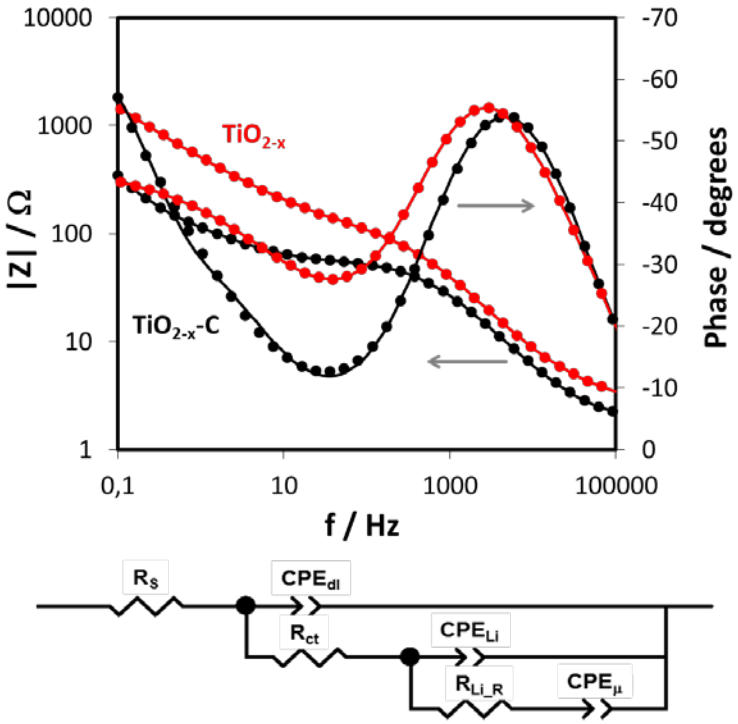


**Figure S2.** Bode plots from EIS data for $TiO_{2-x}$ and $TiO_{2-x}$-C NT and the corresponding equivalent circuit where $R_s$ is the solution resistance, $R_{ct}$ is the charge transfer resistance, $CPE_{dl}$ is related to the double layer capacitance, $CPE_{\mu}$ is related to the chemical capacitance, $R_{Li}$ is the lithiation-reaction resistance and $CPE_{Li}$ relates to the Li capacitance contribution of inserted $Li^+$ ions before the lithiation reaction is accomplished.

**Table S1.** Fit parameters and mean square deviation ($X^2$) as extracted from the equivalent circuit shown in Figure 3 (b) in the main text.

| | $TiO_{2-x}$ | $TiO_{2-x}$-C |
|---|---|---|
| $R_s$ / Ω | 3 | 2 |
| $R_{ct}$ / Ω | 104 | 54 |
| $C_{dl}$ / μF | 1.19 | 2.33 |
| $C_{Li}$ / mF | 1.64 | 1.93 |
| $R_{Li}$ / Ω | 100 | 180 |
| $C_{\mu}$ / mF | 0.88 | 2.13 |
| $X^2$ | 0.00284 | 0.01078 |

$R_s$ is the solution resistance, $R_{ct}$ is the charge transfer resistance, $C_{dl}$ is the double layer capacitance, $C_{\mu}$ is the chemical capacitance, $R_{Li}$ is the lithiation-reaction resistance and $C_{Li}$ corresponds to the Li capacitance contribution of inserted $Li^+$ ions before the lithiation reaction is accomplished.

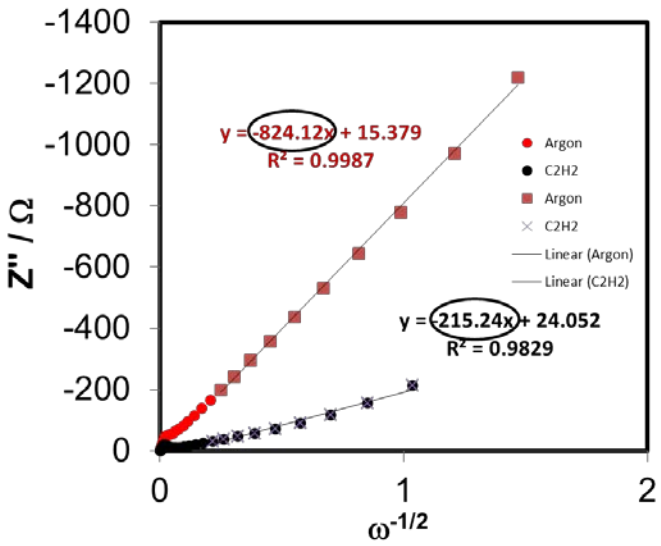


**Figure S3.** Determination of the Warburg factor with 824 for $TiO_{2-x}$ and 215 for $TiO_{2-x}$-C NT), indicating that the effective chemical diffusion coefficient of Li increases upon $C_2H_2$ annealing.