Electronic Supplementary Information

Substantially Enhanced Rate Capability of Lithium Storage in Na$_2$Ti$_6$O$_{13}$ with Self-doping and Carbon-coating

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Fig. S1 SEM images of prepared NTO-based nanowires. (a) Pristine NTO nanowires, (b) carbon coated NTO-C nanowires and (c, d) Ti$^{3+}$ self-doped and carbon coated H-NTO-C nanowires.
Fig. S2 TGA curve of carbon coated NTO-C nanowires.

Fig. S3 Survey scan of NTO, C-NTO and H-C-NTO samples.
Fig. S4 SEM images of (a) NTO and (b) NTO-C electrodes after 300 cycles at 1C rate in Li-ion batteries.

Fig. S5 Galvanostatic profiles of (a) NTO electrode at various current rates. (b) Rate capability comparison of NTO, NTO-C and H-NTO-C electrodes.
Fig. S6 Selected equivalent circuit used to fit the EIS Nyquist plots. The Rs reflects electric conductivity of the electrolyte, separator, and electrodes, which corresponded to the first semicircle at high frequency; Rct and Cdl were the charge transfer resistance and its relative double-layer capacitance, which corresponded to the second semicircle at medium frequency; W was the Warburg impedance related to the diffusion effect of Li, which was generally indicated by a sloping line at low frequency. The fitted Rs and Rct are listed in Table S1.

Table S1. Rs and Rct fitted by Z-view with selected equivalent circuit (Fig. S6)

| Sample   | Rs (Ohm) | Rct (Ohm) |
|----------|----------|-----------|
| NTO      | 7.2      | 343       |
| NTO-C    | 6.9      | 170       |
| H-NTO-C  | 6.7      | 120       |