Supplementary Information

Freestanding highly-defect nitrogen-enriched carbon nanofibers for lithium ion battery thin-film anodes

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**Fig. S1** The fabrication and optical photos of N-doped carbon thin films deposited on three different Cu substrates.

**Fig. S2** SEM micrographs of raw graphite materials, which are the component of the graphite target.
**Fig. S3** SEM micrographs of the pure carbon thin film deposited at 120 W on the copper foil.

**Fig. S4** The surficial EDX selected-area profile of N-doped carbon thin film deposited on the Cu foil.

C : 75.6 at%
N : 24.4 at%
Fig. S5 The cycle performance of the raw graphite electrode cycled at (A) 35 mA g$^{-1}$ and (B) 350 mA g$^{-1}$.

Fig. S6 The cycle performance of the pure carbon thin film cycled at (A) 35 mA g$^{-1}$ and (B) 350 mA g$^{-1}$.
Fig. S7 SEM images of N-doped carbon thin films deposited at different sputtering powers: (A–E) 100, 120, 160, 200, and 240 W, respectively; (F) cycle performance and (G) rate cycle performance of thin films deposited at different sputtering powers.
Fig. S8 The cycle performance of the thick N-doped carbon thin film cycled at (A) 50 mA g\(^{-1}\) and (B) 500 mA g\(^{-1}\). This thick thin film was deposited on the Cu foil at 120 W for 24 h, with the material loading of 3 mg cm\(^{-2}\).