Supporting Information

Fig. S1 SEM images of Si NPs (a) and Si-CN (b).

Fig. S2 XPS survey (a) and Si 2p XPS (b) spectra of Si NPs, Si-CN, Si@CTF and Si@NPC.

Fig. S3 Discharge-charge curves of Si NPs (a) and NPC (b) electrodes at a current rate of 0.1 A g\(^{-1}\) for the 1\(^{st}\), 2\(^{nd}\) cycle and 1 A g\(^{-1}\) for 3\(^{rd}\), 10\(^{th}\), 100\(^{th}\) and 200\(^{th}\) cycle with a cut-off voltage ranging from 0.01 V to 1.2 V (vs. Li/Li\(^{+}\)). (c) The first discharge curves for Si NPs and Si@NPC electrodes.
Fig. S4 SEM images of Si NPs electrode at fresh state (a) and after 100 cycles at 1 A g\(^{-1}\) (b); Si@C-CVD electrode at fresh state (c) and after 100 cycles at 1 A g\(^{-1}\) (d); Si@NPC electrode at fresh state (e) and after 100 cycles at 1 A g\(^{-1}\) (f).

Fig. S5 TEM (a) and HR-TEM (b) images of Si@C-CVD.
Fig. S6 Nyquist plots for Si NPs, Si@CTF and Si@NPC electrodes before cycling (a) and for Si NPs and Si@NPC electrodes after a fixed capacity (1000 mA h g\(^{-1}\)) discharging (b).

Fig. S7 TGA curve of Si@C-CVD in air atmosphere.