

## Supporting Information

### **Reinforced concrete inspired Si/rGO/cPAN hybrid electrode: highly improved lithium storage via Si electrode nanoarchitecture engineering**

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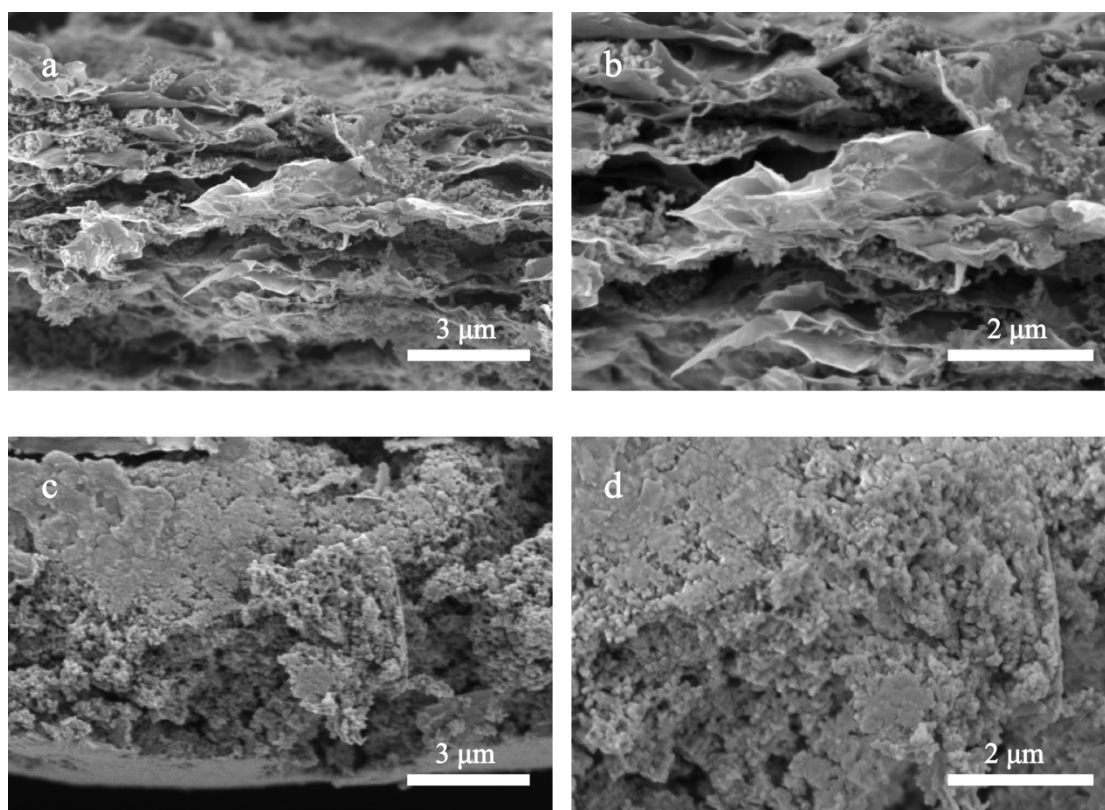


Figure S1 SEM images of (a, b) G-Si and (c, d) cPAN-Si.

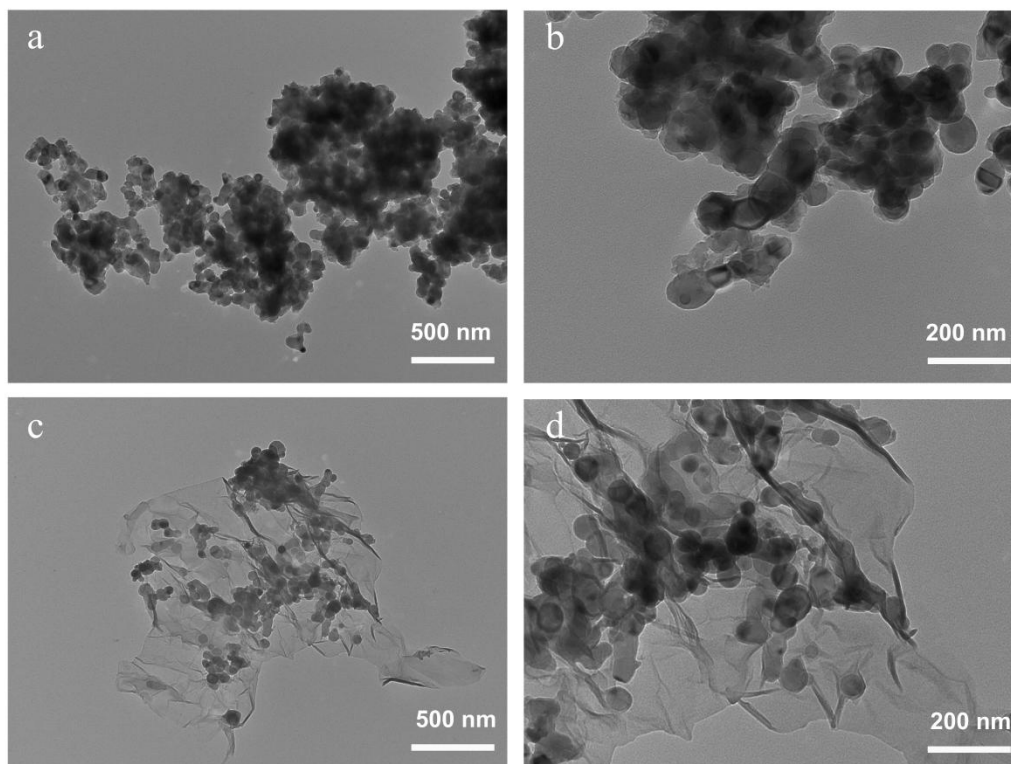


Figure S2 TEM images of (a, b) cPAN-Si and (c, d) G-Si at different magnifications.

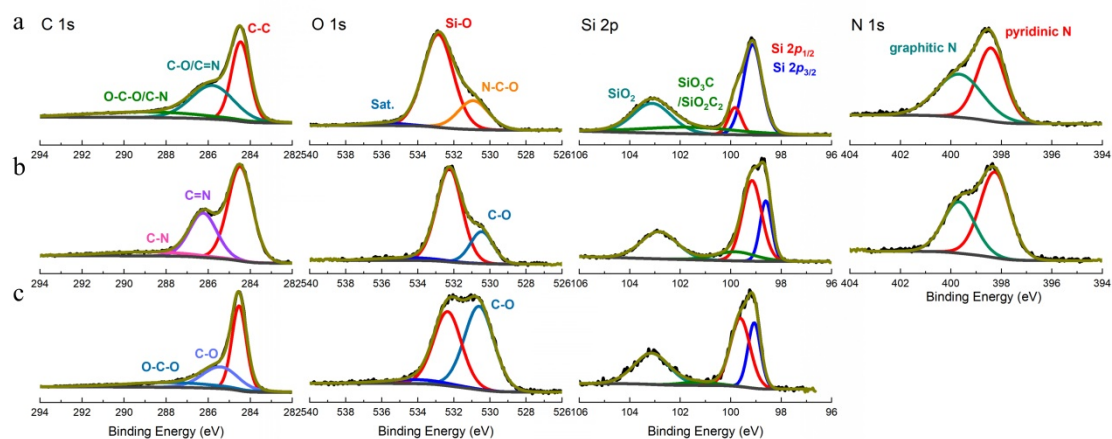


Figure S3 XPS spectra of C 1s, O 1s, Si 2p, N 1s of (a) RC-Si, (b) cPAN-Si and (c) G-Si, respectively.

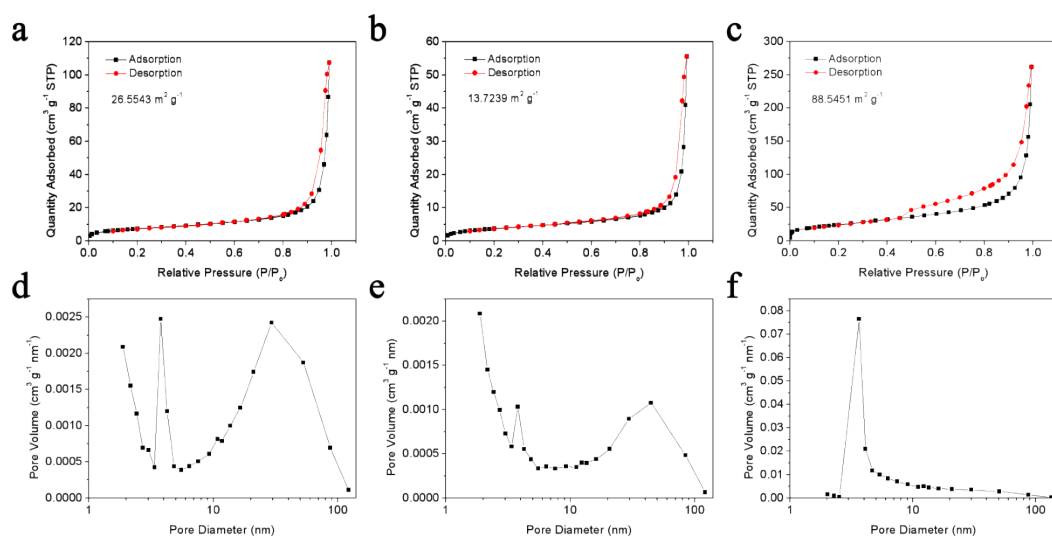


Figure S4 (a-c) Nitrogen adsorption-desorption isotherms with the measured Brunauer Emmett-Teller specific surface area (SSA) and (d-f) Pore size distribution of (a, d) RC-Si, (b, e) cPAN-Si, and (c, f) G-Si.

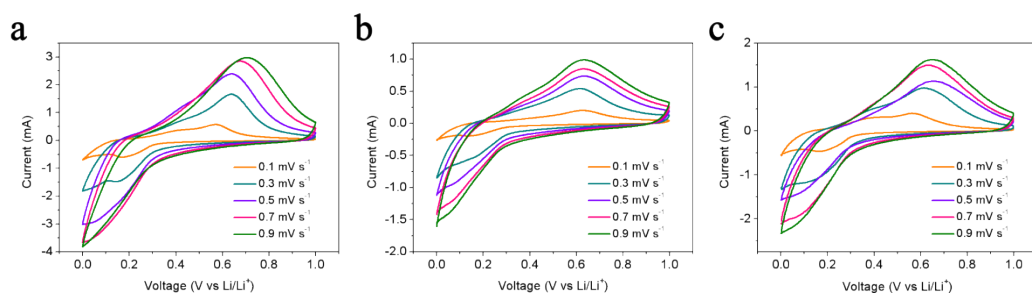


Figure S5 Cyclic voltammograms (CV) at different scan rates. (a) RC-Si, (b) cPAN-Si and (c) G-Si.

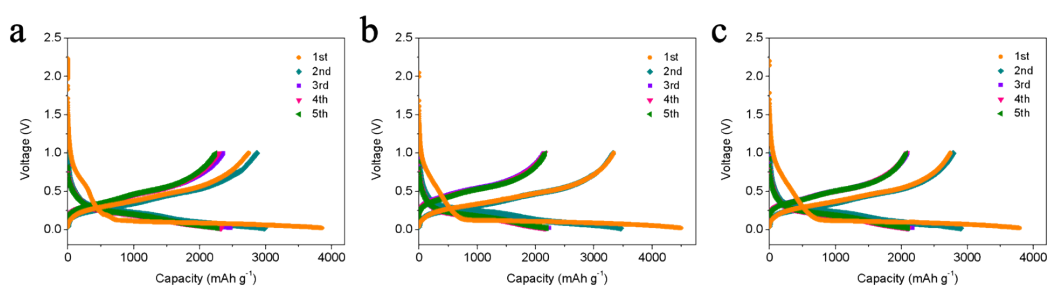


Figure S6 Charge-discharge profiles of (a) RC-Si, (b) cPAN-Si and (c) G-Si for the 1st, 2nd, 3rd, 4th, 5th cycles. The current rate is  $0.2 \text{ A g}^{-1}$  for the 1st and 2nd cycles, and  $2 \text{ A g}^{-1}$  for the 3rd, 4th and 5th cycles.

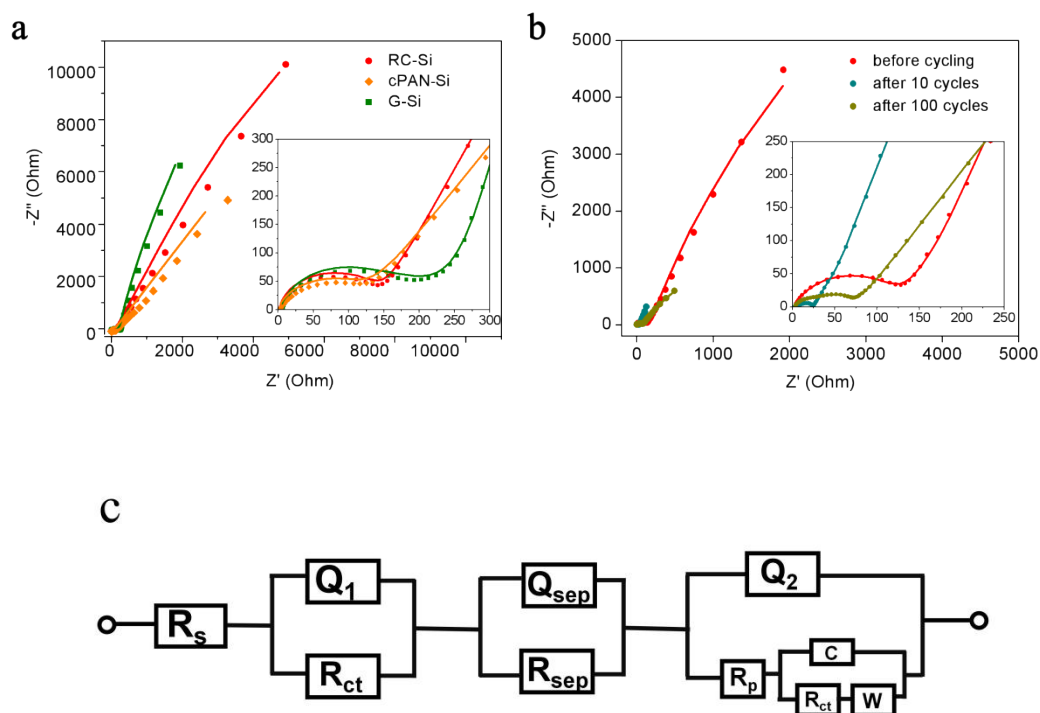


Figure S7 Nyquist plots of (a) RC-Si, cPAN-Si, and G-Si obtained from Electrochemical Impedance Spectra (EIS) measurements and the RC-Si anode tested (b) before cycling, after 10th and 100th lithiated and delithiated cycles. (c) Equivalent circuit diagrams relative to the EIS test.

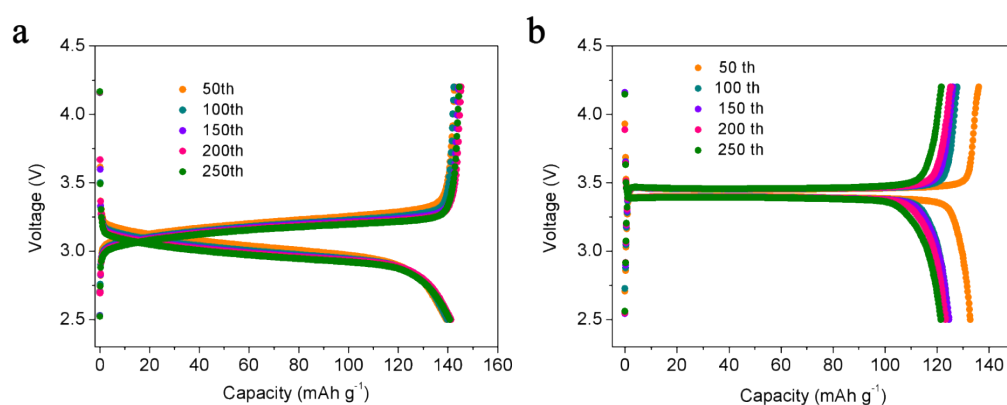


Figure S8 Charge-discharge profiles of (a) LFO/RC-Si and (b) LFO-Li for the 50th, 100th, 150th, 200th, 250th cycles. The current rate is 0.5 C (1 C=170 mA g<sup>-1</sup>).

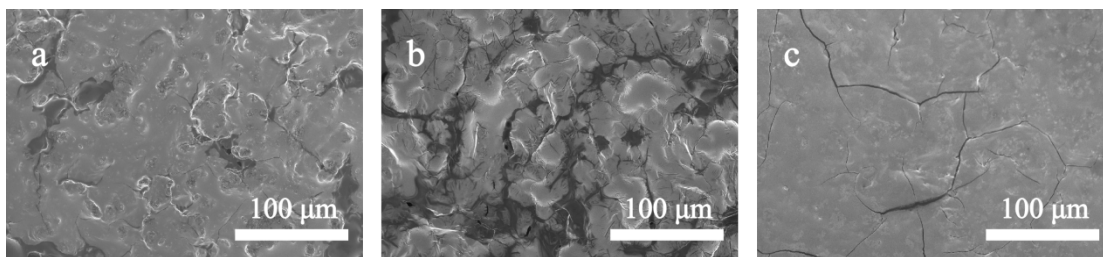


Figure S9 Top view SEM images of (a) RC-Si, (b) cPAN-Si and (c) G-Si after 10 cycles.

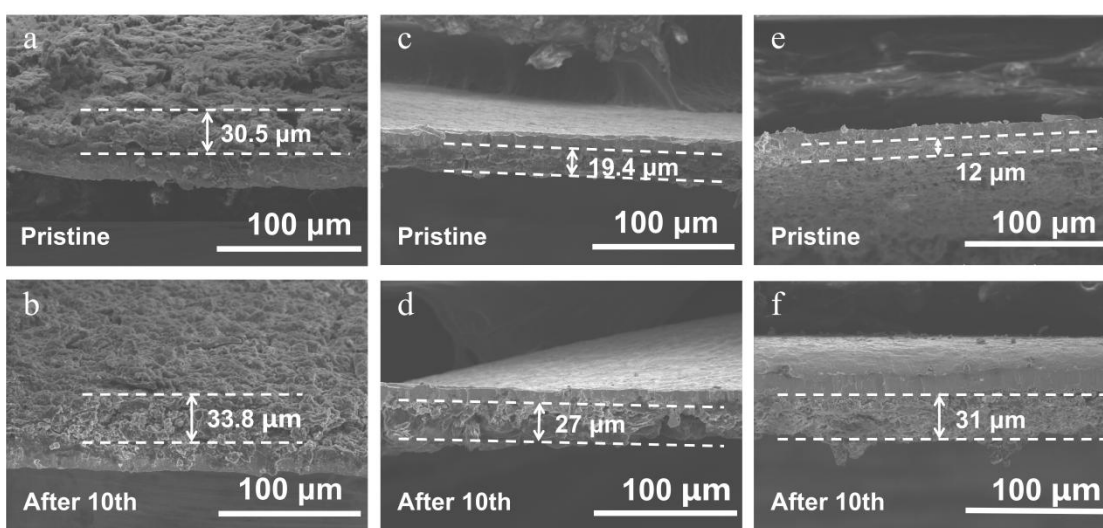


Figure S10 Cross-section SEM images of (a-b) RC-Si, (c-d) cPAN-Si, and (e-f) G-Si, demonstrating the thickness change before and after 10th charging and discharging.

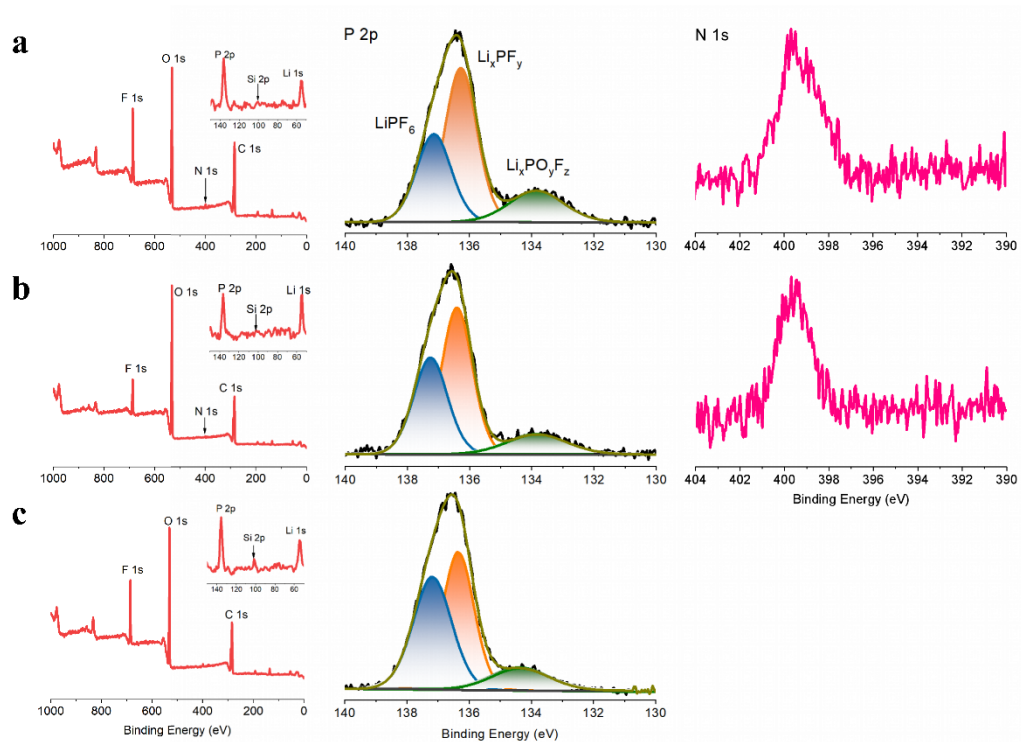


Figure S11 The interfacial chemical composition after 10 cycles. The wide range spectra, P 2p and N 1s XPS spectra of (a) RC-Si, (b) cPAN-Si, and (c) G-Si.