# Supporting Information

## Building a Cycle-Stable Fe-Si alloy/Carbon Nanocomposite Anode for Li-Ion Batteries through a Covalent Bonding Method

*Hui Wang[a], Sijia Fan[a], Yuliang Cao[a], Hanxi Yang[a], Xinping Ai*[a], Faping Zhong*[b]*

[a] Hubei Key Lab of Electrochemical Power Sources, College of Chemistry & Molecular Science, Wuhan University, Wuhan, 430072, China.

[b] National Engineering Research Center of Advanced Energy Storage Materials, Changsha, 410205, China

***Corresponding Author**

E-mail address: xpai@whu.edu.cn (X. Ai), zfp@corun.com (F. Zhong)

**Supplementary tables and figures**

Table S1. Chemical composition of the pristine Fe-Si alloy measured by XRF

| Element | Si | Fe | O | Ca | Al | C | P | Other impurities |
|---|---|---|---|---|---|---|---|---|
| Mass percentage (wt.%) | 71.43 | 19.59 | 4.8 | 1.94 | 1.05 | 0.51 | 0.346 | 0.334 |

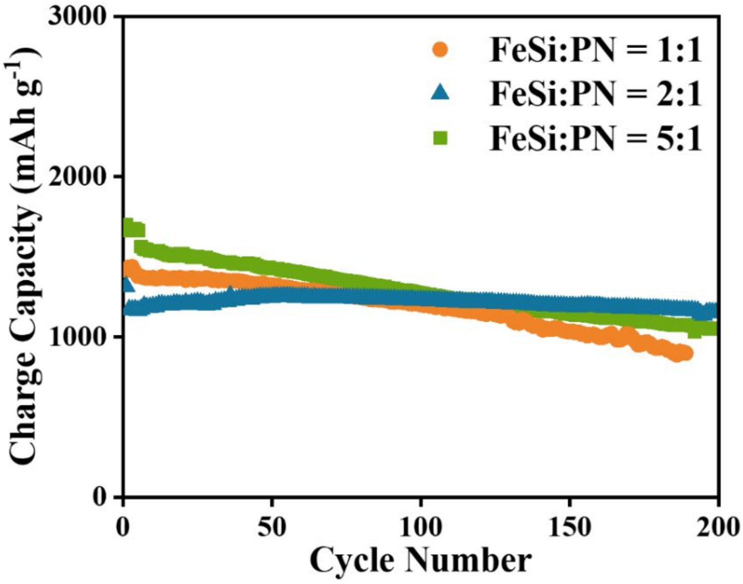


**Figure S1.** Cycling performance of the Fe-Si/C composites prepared with different Fe-Si/PN weight ratios at a current density of 2.0 A $g^{-1}$.

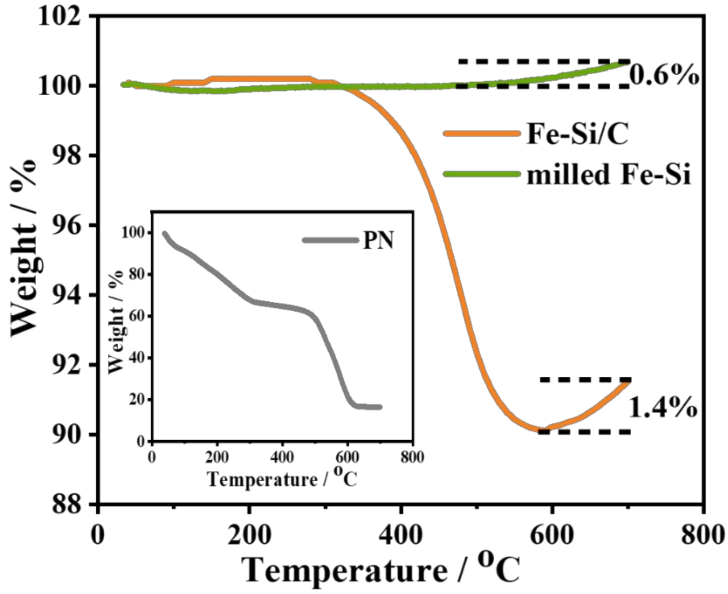


**Figure S2.** TG curves of the Fe-Si/C composite, sand-milled pristine Fe-Si alloy particles and pure PN polymer (inset) under air atmosphere.

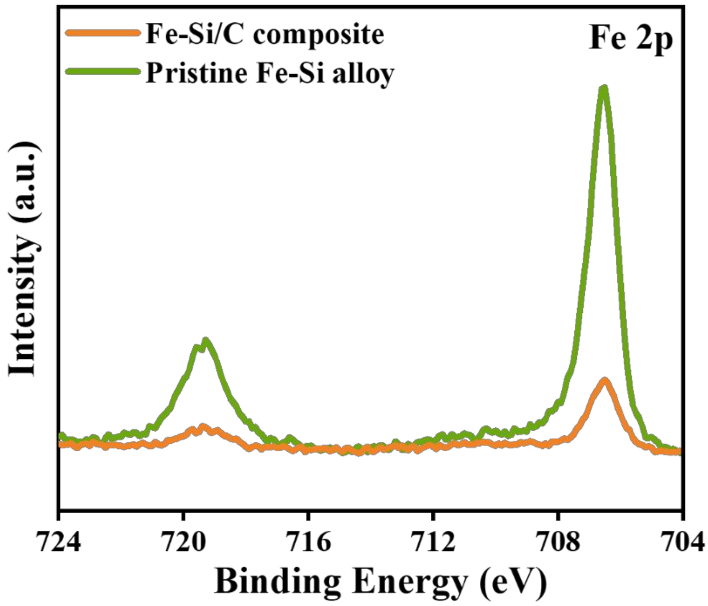


**Figure S3.** Fe 2p XPS spectra of the Fe-Si/C composite and the pristine Fe-Si alloy particles.

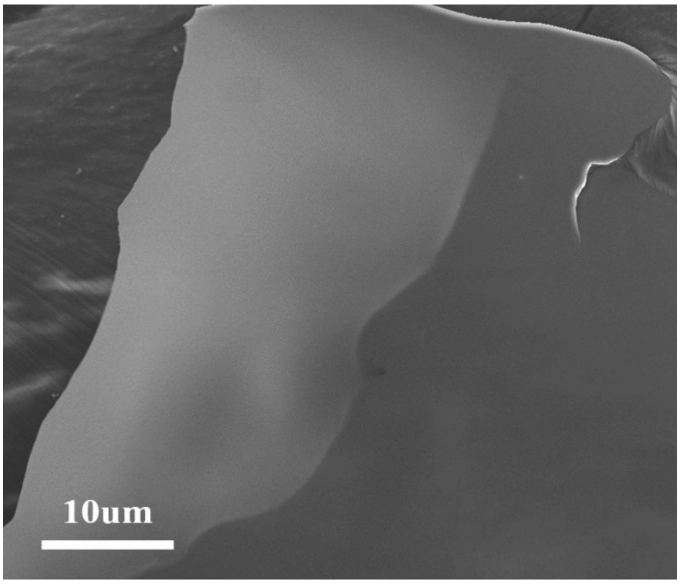


**Figure S4.** SEM image of the PN-derived carbon.

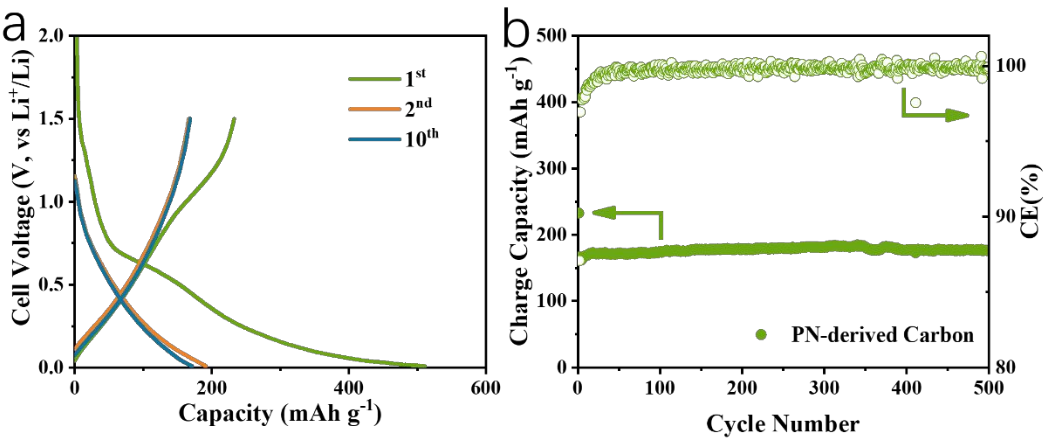


**Figure S5.** Cycle performance and charge/discharge profile of the PN-derived carbon electrode in the Li-half cell at a current density of 200 mA $g^{-1}$ in the voltage interval of 0 – 1.5 V.

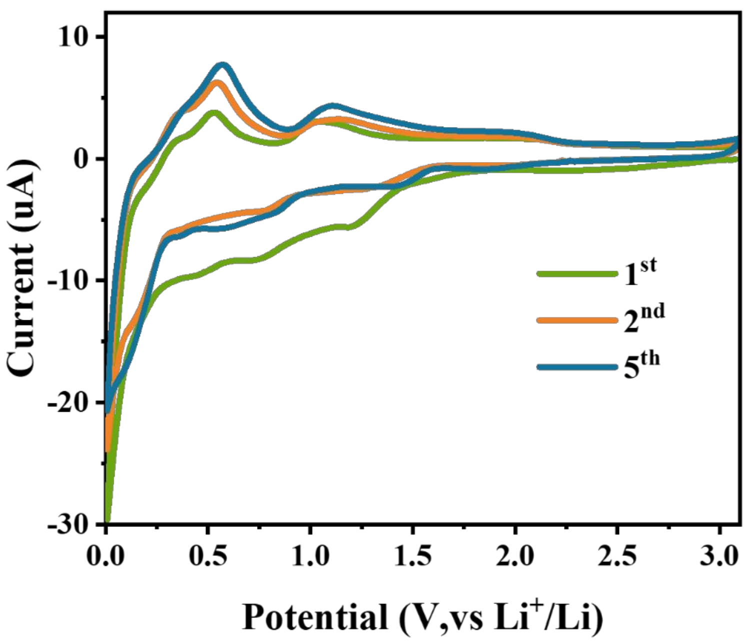


**Figure S6.** CV curves of the Fe-Si/C anode obtained at a scan rate of 0.05 mV $s^{-1}$.

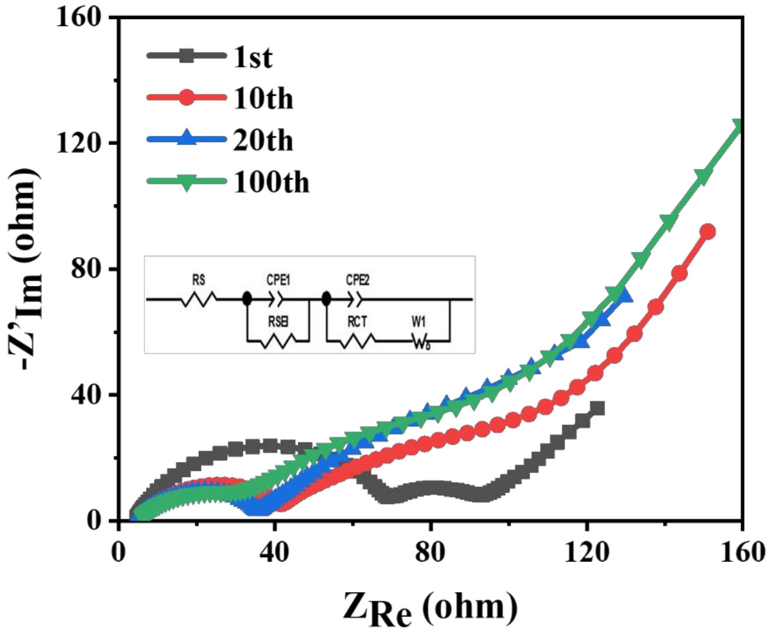


**Figure S7.** Nyquist plots of the Fe-Si/C anode at different cycles.