Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting information

Novel hybrid Si nanocrystals embedded in a conductive SiO_x@C matrix from one single precursor as a high performance anode material for Lithium-ion batteries

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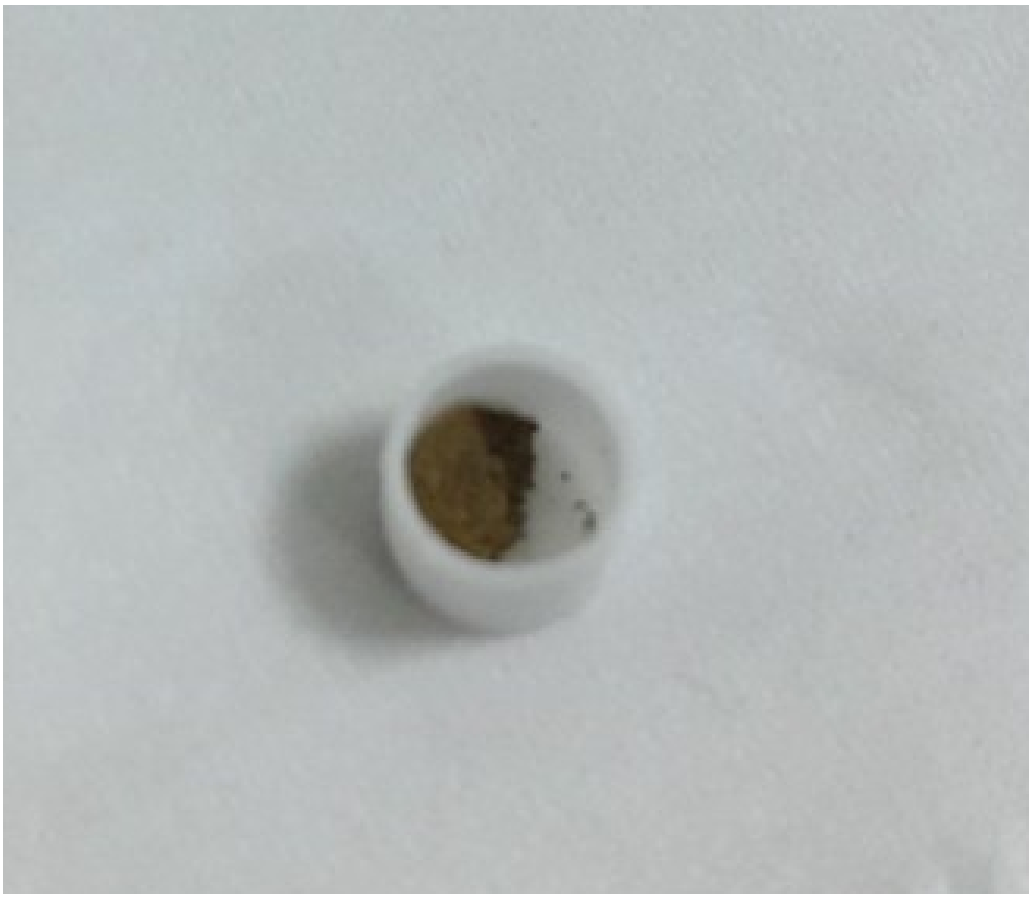

Fig. S1 Si/SiO_x@C sample after TGA in air changed from a black color to brownish.

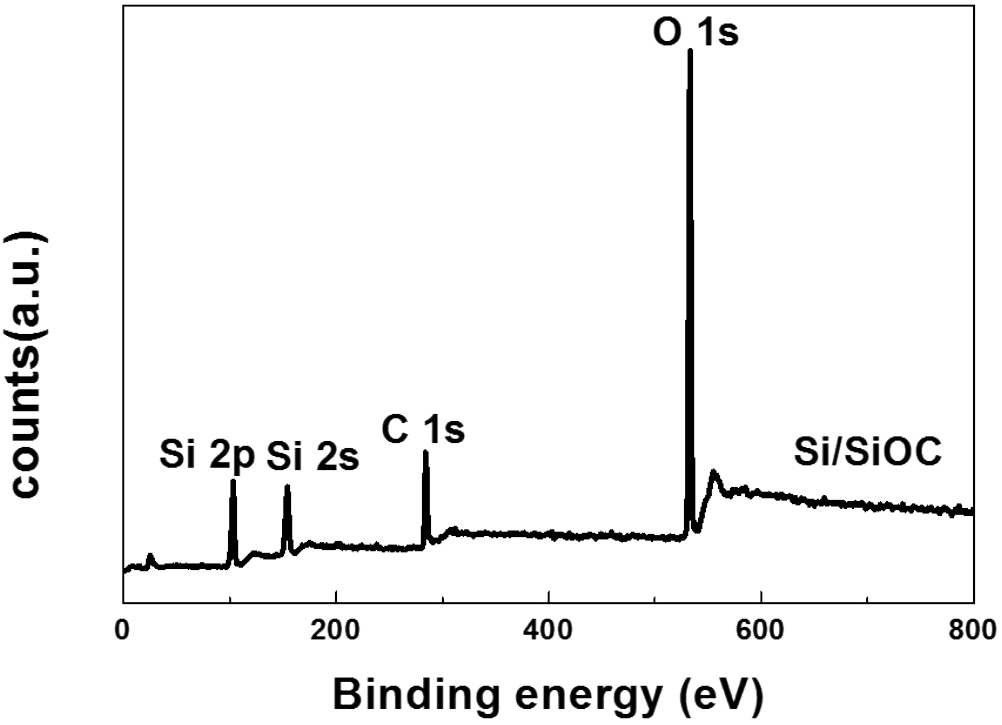

Fig. S2 Survey XPS spectrum of Si/SiO_x@C.

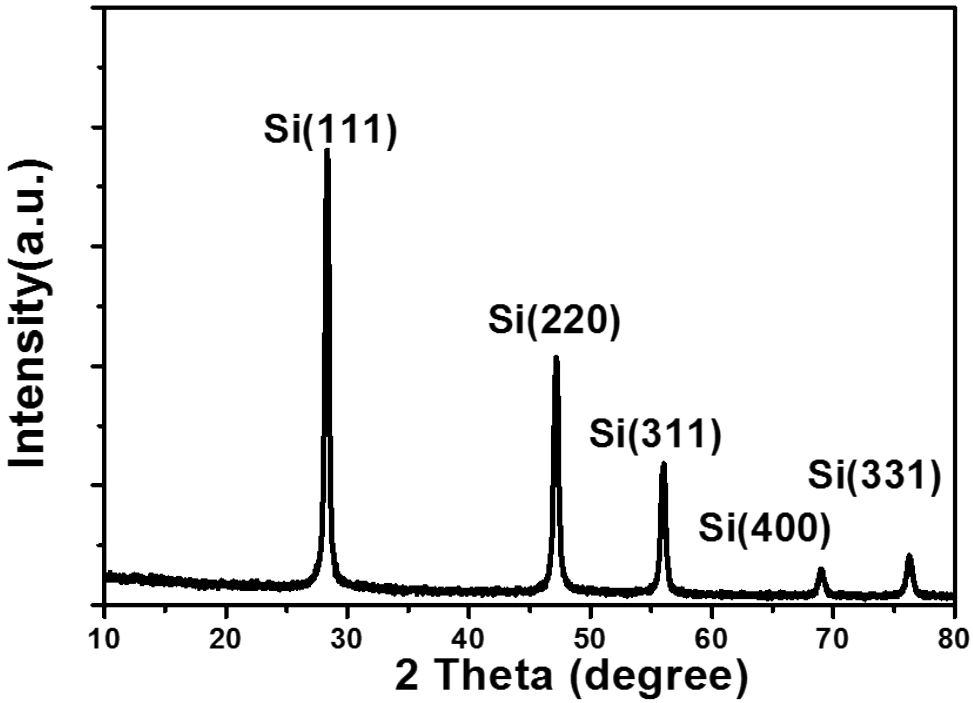

Fig. S3 XRD pattern of the nano-crystalline Si.

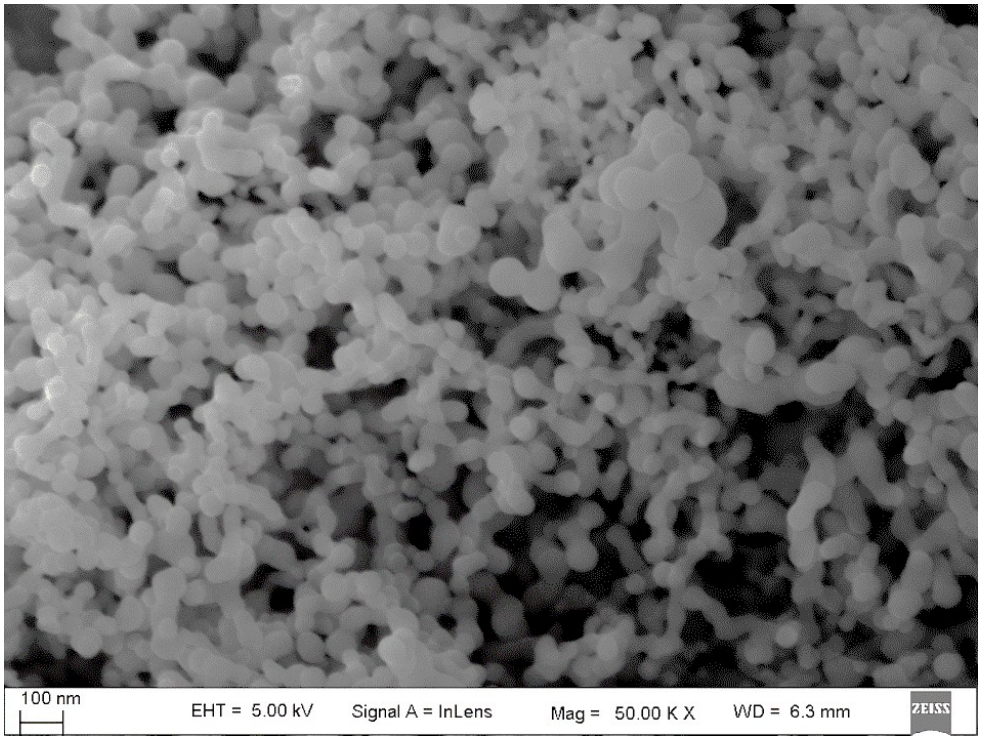

Fig. S4 TEM image of the nano-crystalline Si.

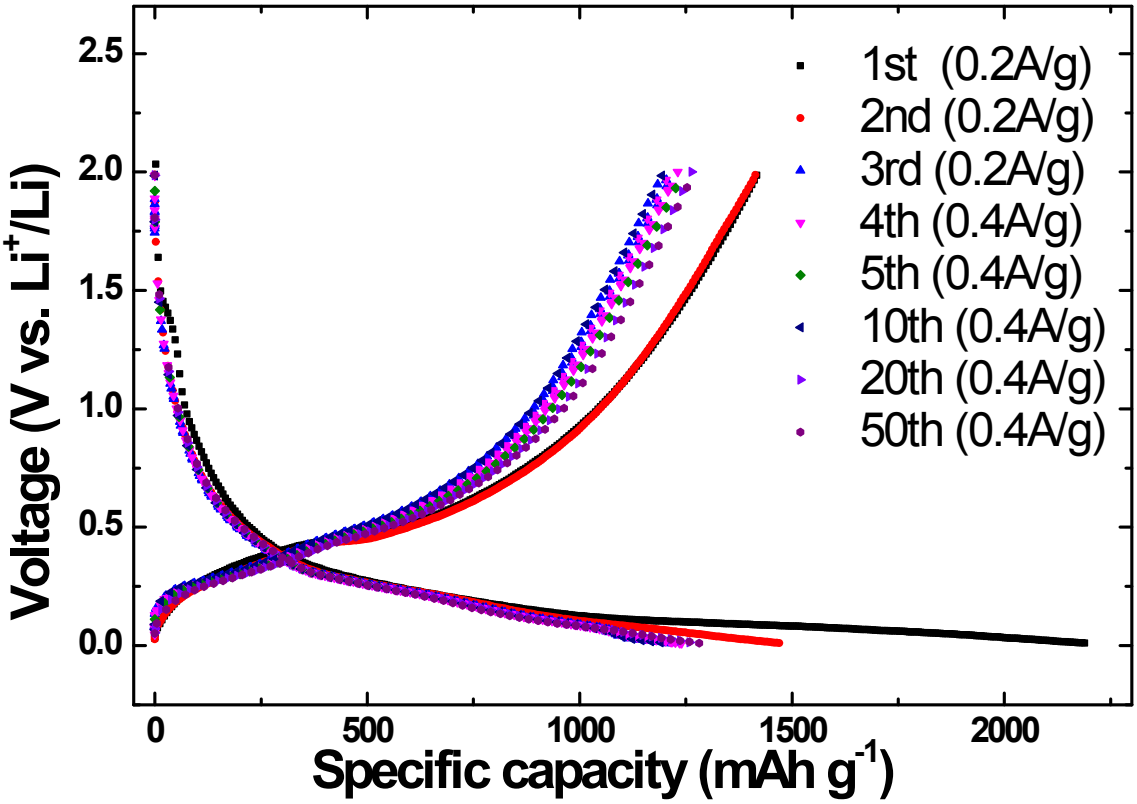

Fig. S5 Charging/discharging profiles of the Si/SiO_x@C anodes of the 1st, 2nd, 3rd, 4th, 5th, 10th, 20th, and 50th cycle.

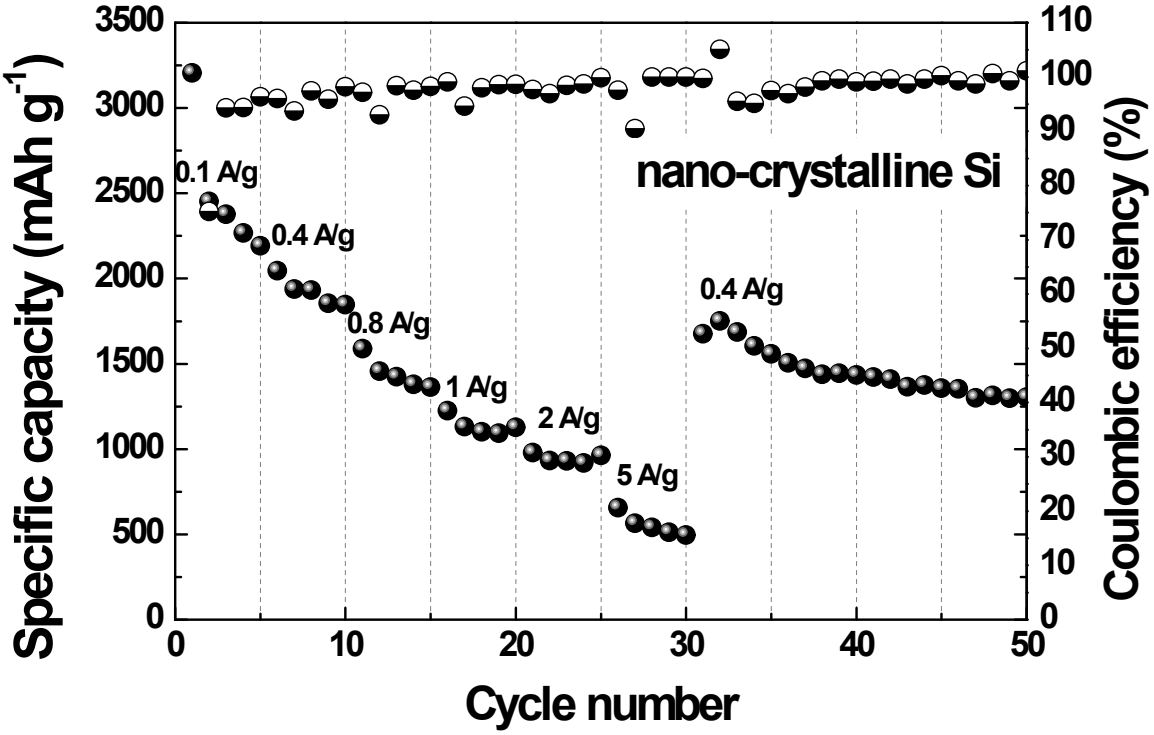

Fig. S6 Rate performance of nano-crystalline Si at various current densities. The voltage range is 0.01–2.0 V vs. Li^+/Li.

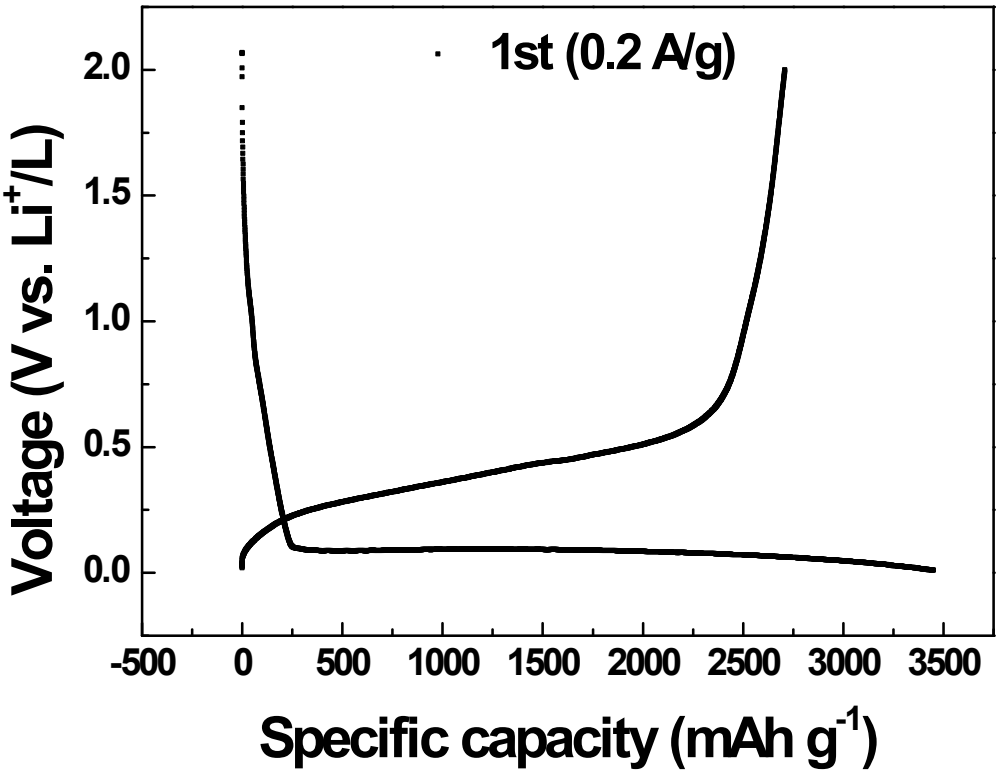

Fig. S7 Charging/discharging profiles of nano-crystalline Si of the 1st cycle.

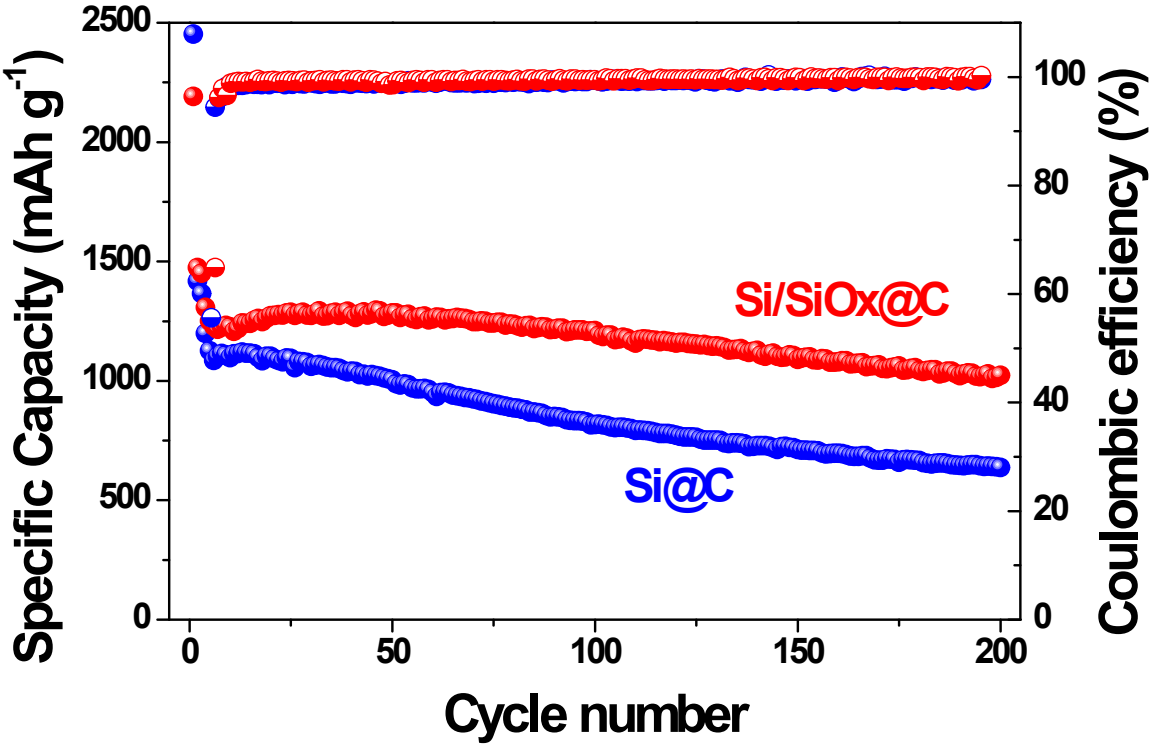

Fig. S8 Cycling performance and CE of Si@C and Si/SiOx@C at a current density of 0.1 A g^{-1} for the 1st, 2nd and 3rd cycle, then at 0.4 A g^{-1} for the latter cycles. The Si@C material is a Si/SEG/C composite and the material was prepared and tested using the method reported in Ref. S2.

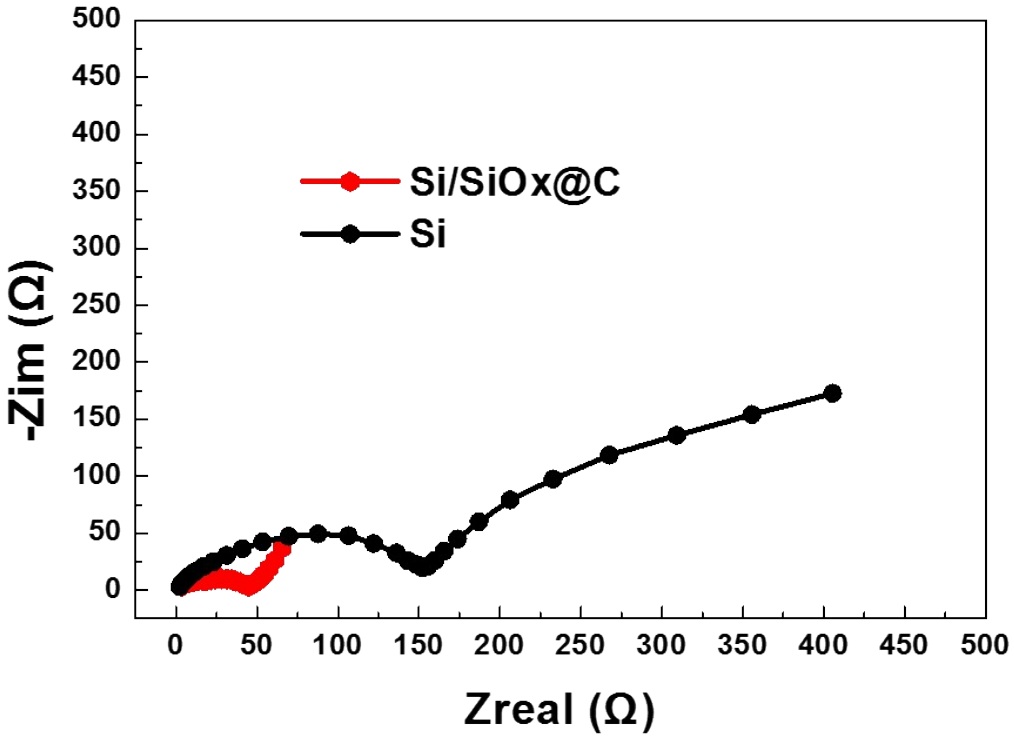

Fig. S9 Nyquist plots conducted on Si/Si/SiO_x@C and Si anodes after ten cycles at a current density of 400 mA g^{-1}.

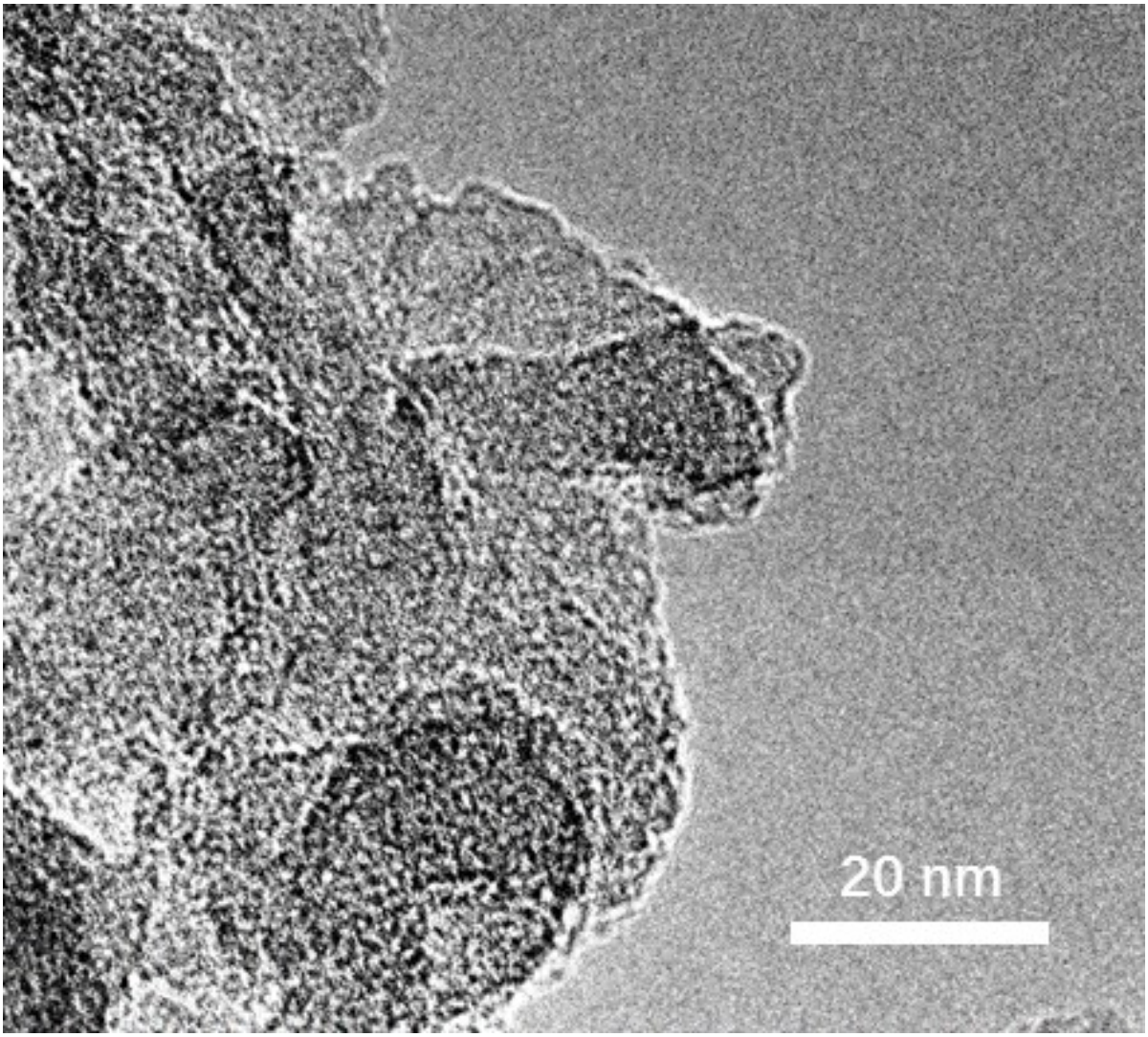

Fig. S10 TEM images of Si/Si/SiO_x@C after 200 charging/discharging cycles, obtained after charging to 2.0V.

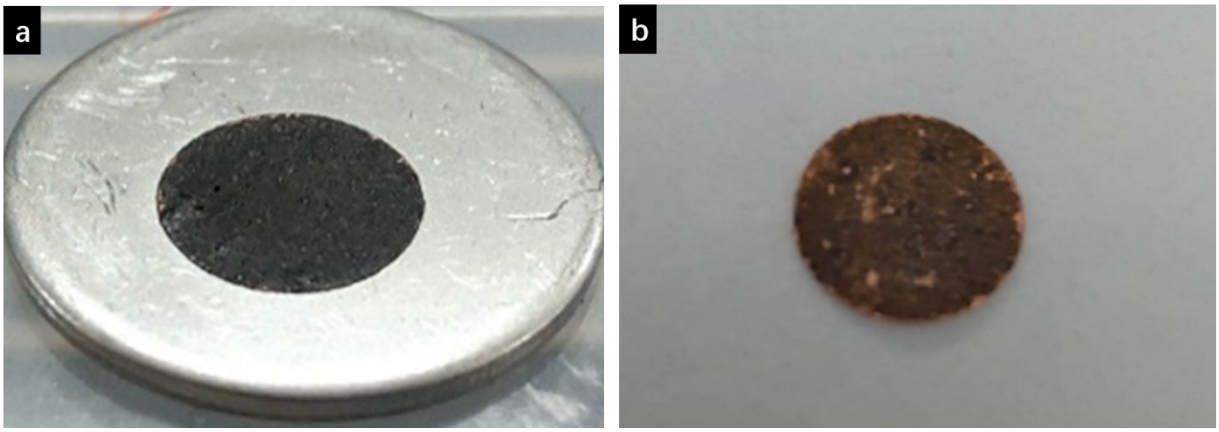

Fig. S11 Photos of the spent (a)Si/SiO_x@C and (b)Si anodes after 200 cycles.

Table S1. Specific capacity and cycling capability of various kinds of anodes for LIBs

Materials	**Specific capacity (mAh/g)**	**Current density (A/g)**	**Cycling capability**	**Ref.**
Si/SiO_x@C	**1250**	**0.4**	**200^{th}, 81.84%**	**This work**
SiOC anode	676	0.2	250^{th},125%	S1
Si/C composite	1796	0.2	250^{th},12.36%	S1
Si/SEG/C composite	1056	0.5	50^{th},84.70%	S2
Silicon–Carbon–Nitrogen Composite	314	0.1	100^{th},99%	S3
Hierarchical composites Si@SiC@C	1328	1	50^{th},78.84%	S4
Hollow core shell-structured Si–C composites	1780	0.1C	50^{th},22%	S5
silicon/nitrogen-doped carbon/carbon nanotube spheres	1484	0.5	100^{th},69%	S6
Si/SiO2@C composite	658.8	0.05	100^{th},73.16%	S7

References

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