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

Supporting Information

Silicon Nanoparticles Embedded in Porous Carbon Matrix as High-Performance Anode for Lithium-Ion Batteries

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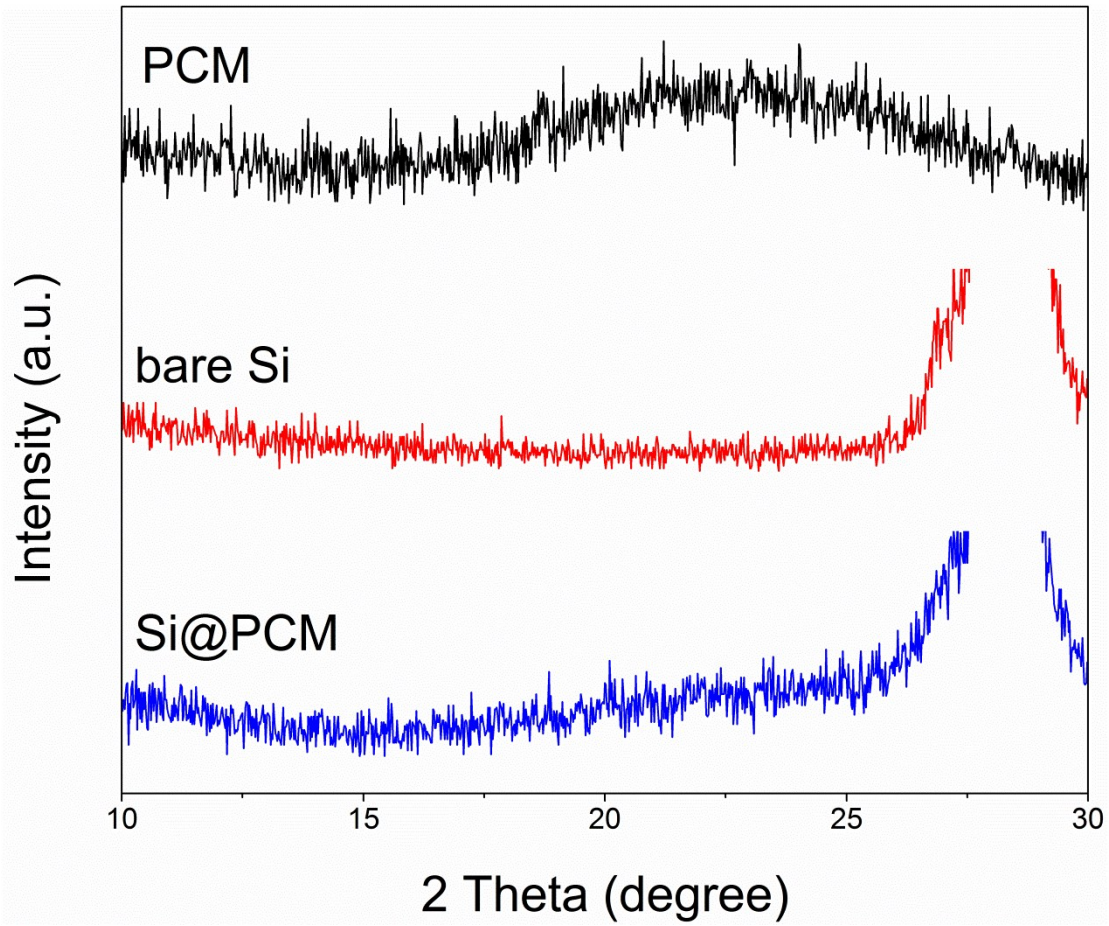

Figure S1. Fine XRD patterns of the PCM, bare Si and Si@PCM samples between 10° and 30°

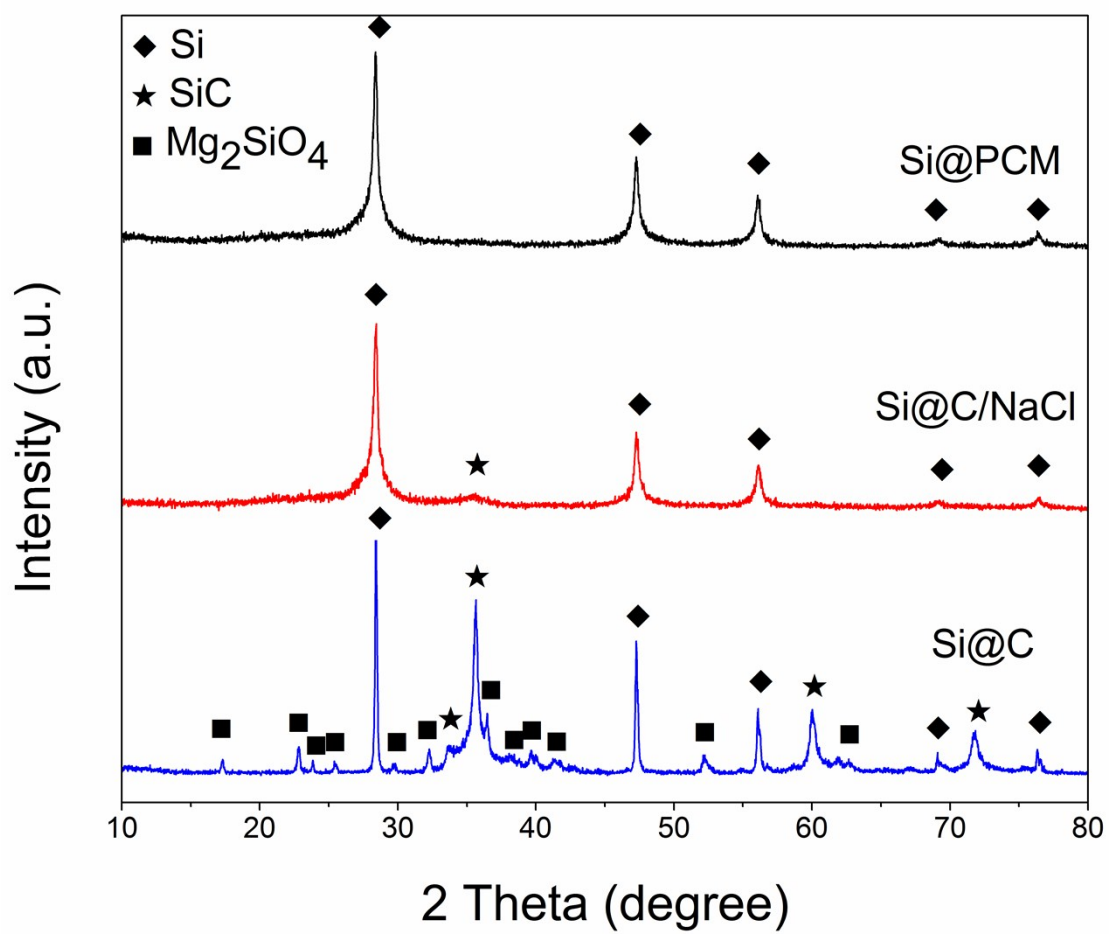

Figure S2. XRD patterns of Si@PCM, Si@C/NaCl and Si@C synthesized by using SiO_2@PCM@NaCl, SiO_2@C/NaCl and SiO_2@C as precursors during magnesiothermic reduction.

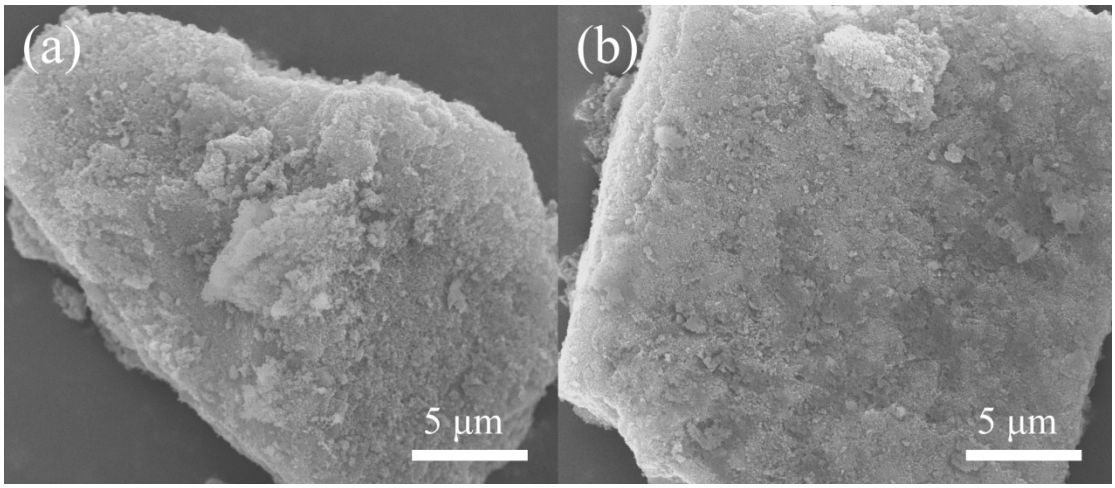

Figure S3. SEM images of Si@C/NaCl and Si@C samples.

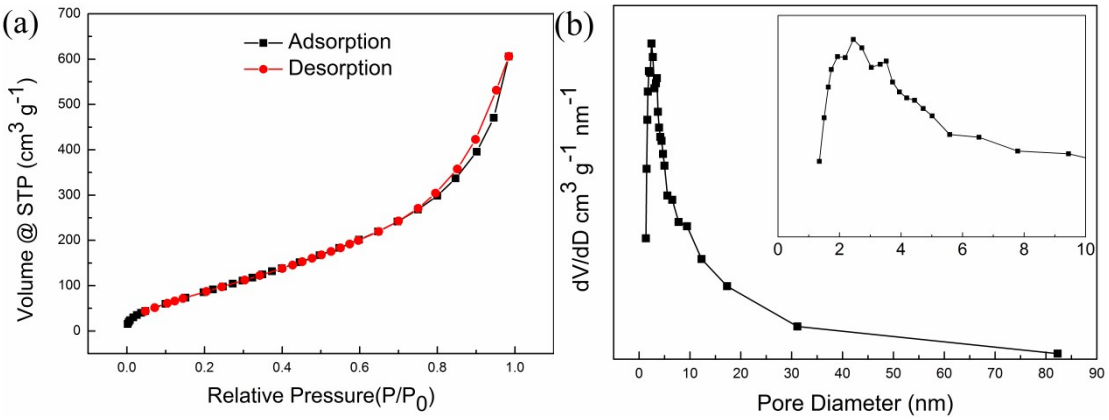

Figure S4. (a) Nitrogen adsorption-desorption isotherm and (b) pore size distributions of the Si@PCM composite.

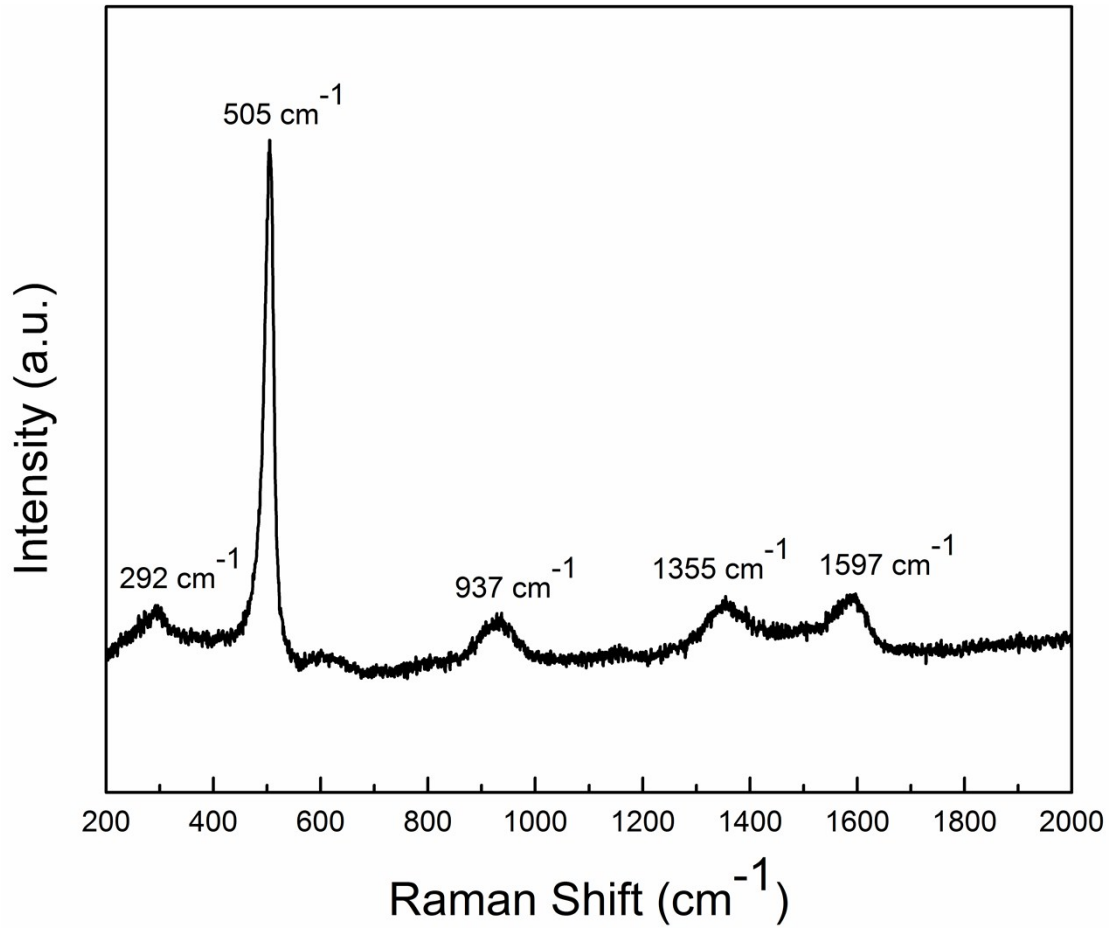

Figure S5. Raman spectrum of the Si@PCM composite.

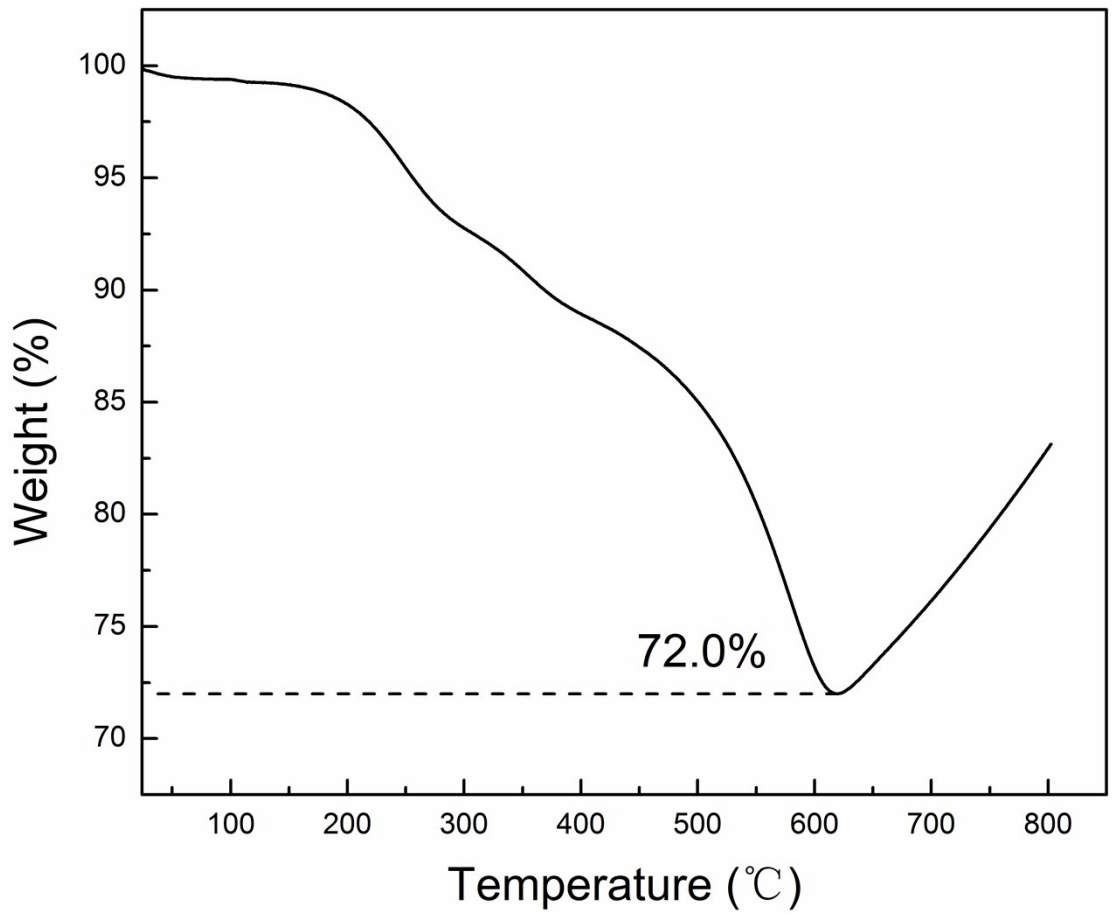

Figure S6. TGA curves of Si@PCM composite measured at a heating rate of 10 °C min^{-1} in air.

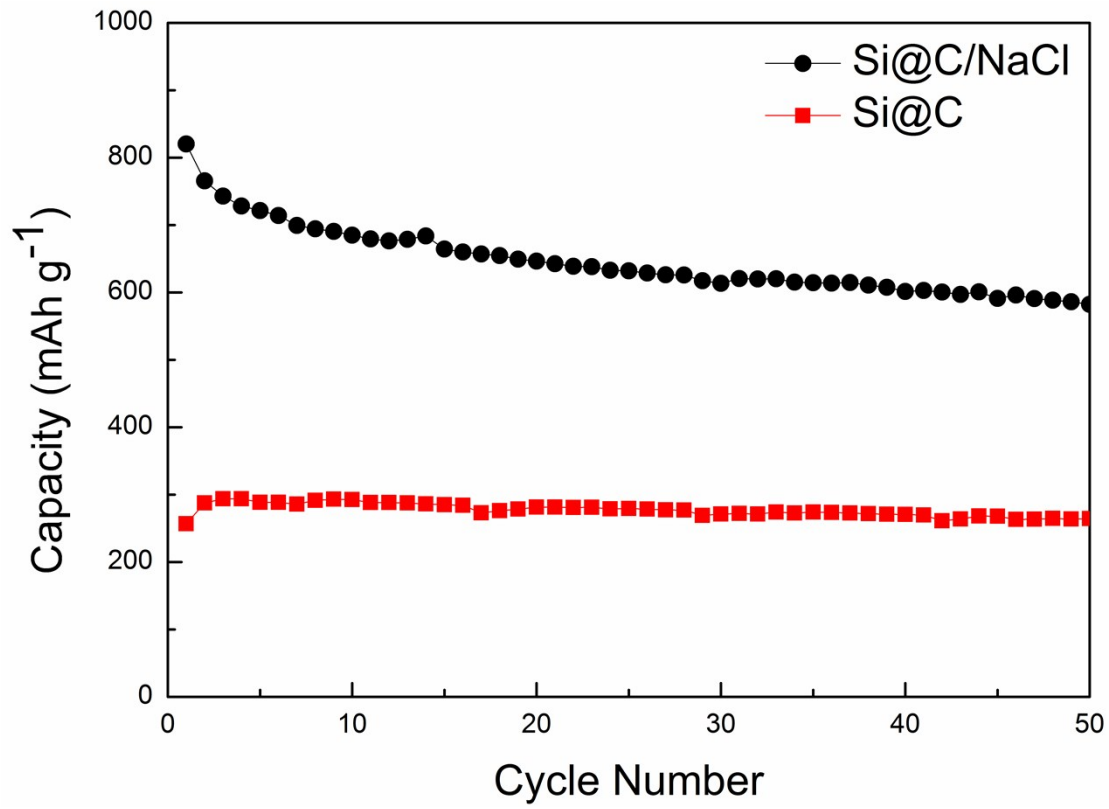

Figure S7. Cycling performance of Si@C/NaCl and Si@C cycled at a current density of 0.5 A g^{-1}.

Table S1. Electrochemical performance of Si/C composite anodes synthesized through magnesiothermic reduction in this work and in previous reports.

Si anodes	Initial charge capcacity	Capacity retention	Rate performance	Reference
Si@PCM	1215.1 mAh g^{-1}	1249 mAh g^{-1} after 100 cycles at 0.5 A g^{-1}	~550 mAh g^{-1} at 10 A g^{-1}	This work
Mesoporous Si/C composite	1233.3 mAh g^{-1}	1054 mAh g^{-1} after 50 cycles at 0.1 A g^{-1}	270 mAh g^{-1} at 2 A g^{-1}	1
Si/nanographite sheets	1702.9 mAh g^{-1}	975.7 mAh g^{-1} after 100 cycles at 0.1 A g^{-1}	672.2 mAh g^{-1} at 2 A g^{-1}	2
Si/N-doped carbon/CNS	1485 mAh g^{-1}	1031 mAh g^{-1} after 100 cycles at 0.5 A g^{-1}	~700 mAh g^{-1} at 2 A g^{-1}	3
Si@carbon fibres	1071.5 mAh g^{-1}	546.9 mAh g^{-1} after 200 cycles at 1 A g^{-1}	466.8 mAh g^{-1} at 12.8 A g^{-1}	4
Si@SiC@C	1705 mAh g^{-1}	937 mAh g^{-1} after 80 cycles at 0.5 A g^{-1}	350 mAh g^{-1} at 2 A g^{-1}	5
Si/SiO_x@C	1450 mAh g^{-1}	940 mAh g^{-1} after 100 cycles at 1 A g^{-1}	630 mAh g^{-1} at 5 A g^{-1}	6

Reference

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