Supporting Information

Pomegranate Type Si/C Anode with SiC Taped, Well-Dispersed Tiny Si Particles for Lithium-Ion Batteries

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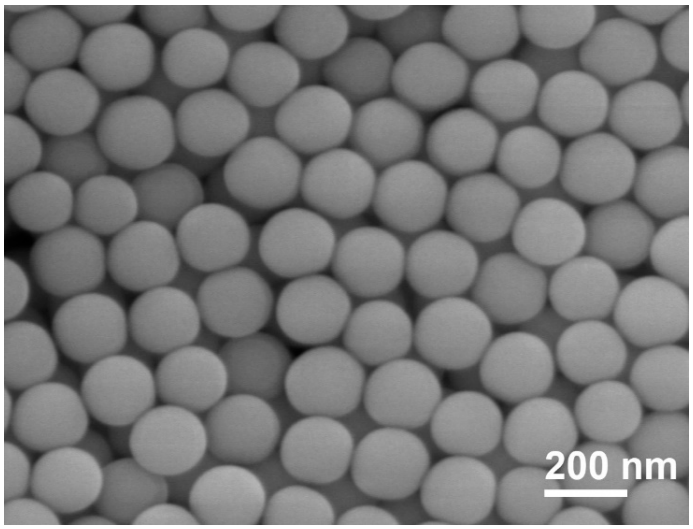

Figure S1. SEM image of SiO_2 nano-particles.

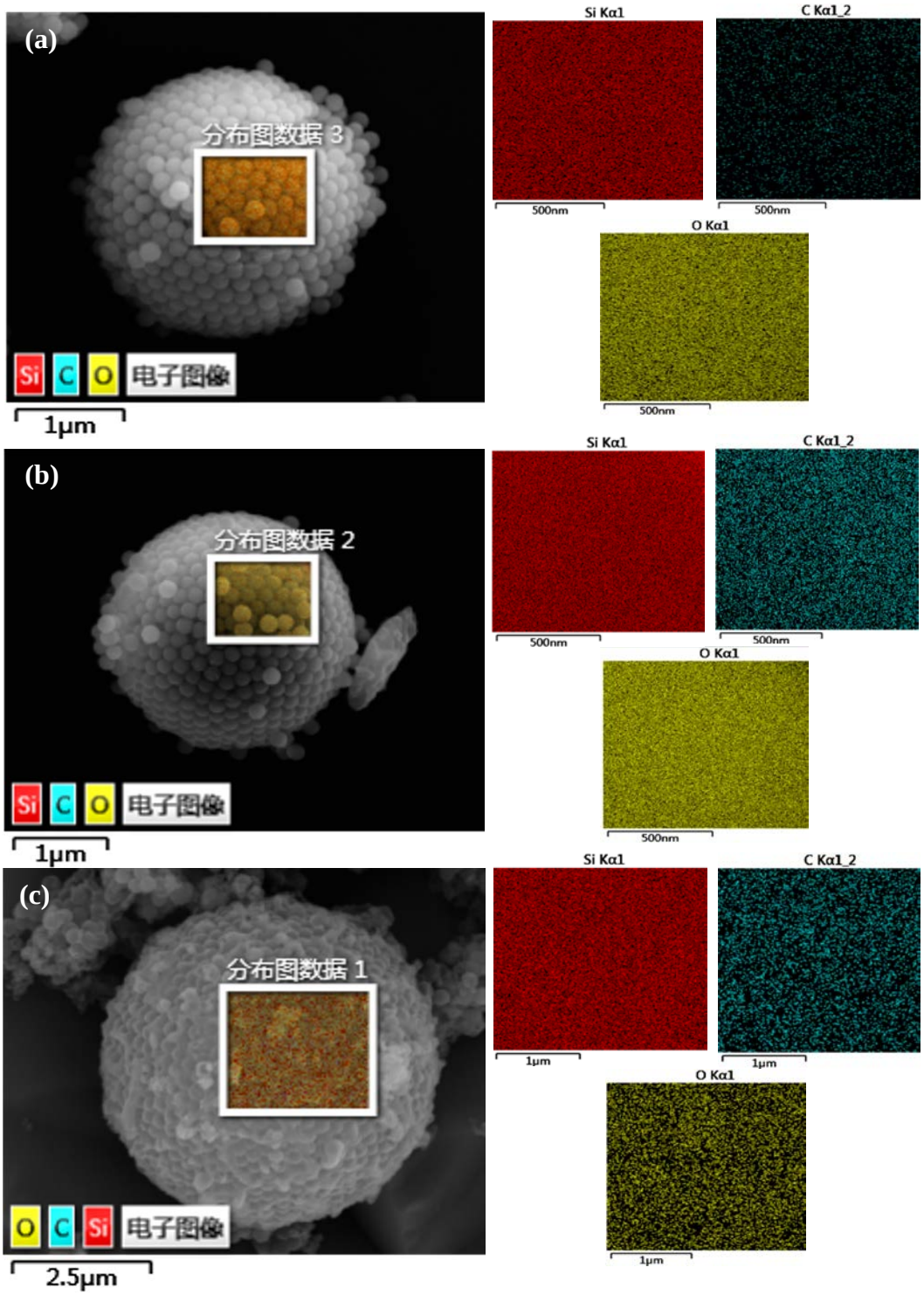

Figure S2. SEM-EDS mapping images of a) micro-sized SiO_2 cluster particle, b) micro-sized SiO_2/C cluster particle, and c) pomegranate-shape-like PSi/C nanocomposite.

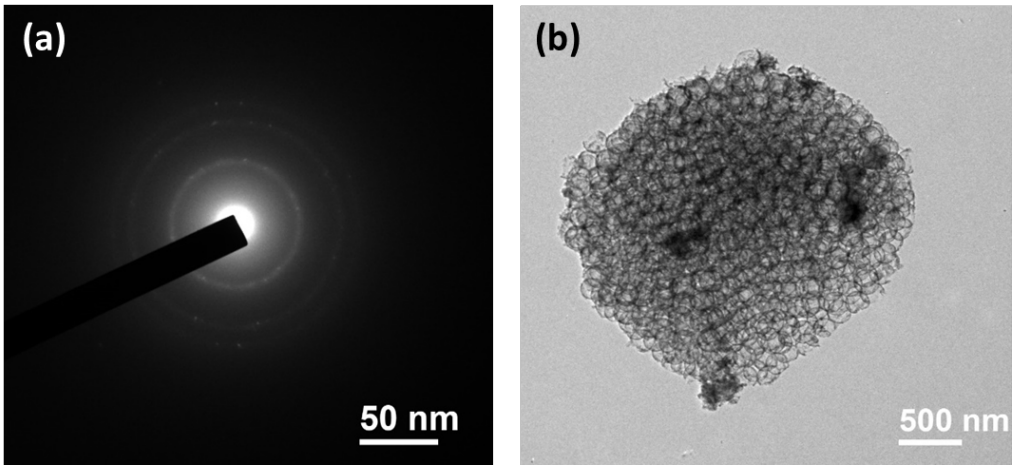

Figure S3. a) Selected area electron diffraction and b) carbon skeleton after silicon is etched away.

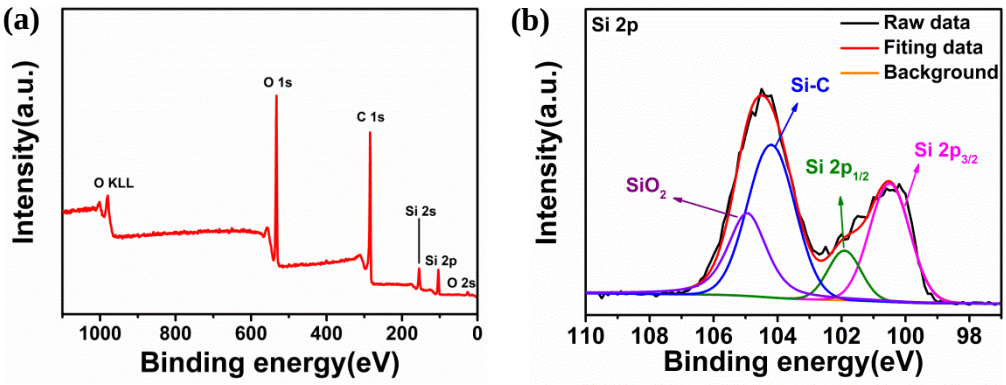

Figure S4. XPS spectrum a) survey vision and b) high revolution vision of Si 2p region of PSi/C nanocomposite.

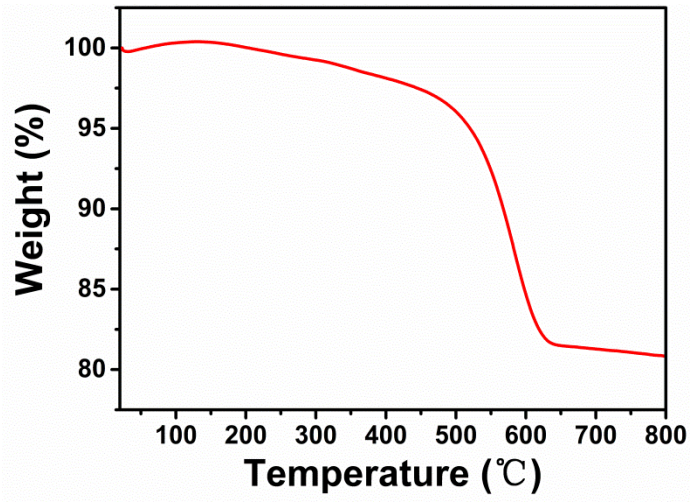

Figure S5. TGA of pomegranate-shape-like PSi/C nanocomposite.

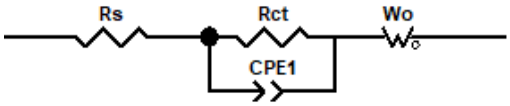

Figure S6. Equivalent circuit for Nyquist plot of PSi/C anode. The interfacial and charge transfer resistances are 3.048 and 44.57 Ω.

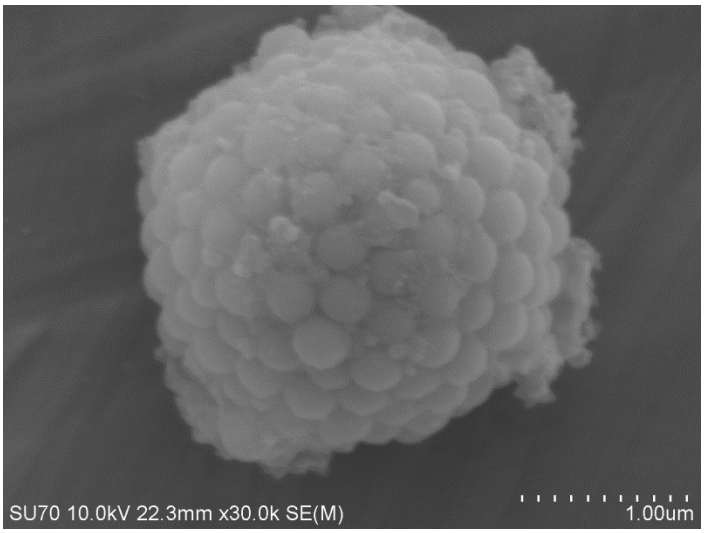

Figure S7. SEM image of the anode material after deep cycling.

Table S1. The proportions of silicon, silicon carbide, and C in PSi/C composite.

Component	Carbon element content		Free C content	SiC content	Si content
	TG analyzer	C/S analyzer			
Proportion (wt.%)	18.6	25.9	18.6	24.3	57.1

Carbon element content was analyzed by two methods: TG and C/S analyzer. The former one is a normal method to characterize the ratio of amorphous and crystalline carbon material in the composites just by heating the sample in the air. By C/S analyzer, the total carbon content including carbon materials and carbon element in C-containing compounds can be gain. So the difference value between this two is the real value of carbon element content in SiC component (7.3%). Then, the proportions of free C, SiC and Si can be calculated as 18.6%, 24.3% and 57.1%, respectively.

Table S2. Recent works about SiC containing Si based anode for LIBs and the details of SiC preparation method and cycling performance.

Anode materials	SiC preparation method	Free C content (wt%)	Initial CE	Initial capacity	Capacity remained	Current density	Ref.
p-SiO_x/ SiC@C	MR	24.1%	59.3%	712 mAh g^{-1} at 100 mA g^{-1}	120% after 100 cycles	100 mA g^{-1}	1
Hollow Si/SiC/C	MR	-	~42.6%	1268 mAh g^{-1} at 100 mA g^{-1}	~40% after 220 cycles	100 mA g^{-1}	2
Nc-Si/SiC	Plasma jet	-	68.2%	1650 mAh g^{-1} at 0.1 C	58% after 30 cycles	0.1 C	3
C/SiC/Si composite fibers	MR	60%	15.2%	524.5 mAh g^{-1} at 400 mA g^{-1}	138% after 900 cycles	400 mA g^{-1}	4
Sea-sponge-C/SiC@SiC/C	MR	39.3%	31%	929.8 mAh g^{-1} at 500 mA g^{-1}	65.8% after 2000 cycles	500 mA g^{-1}	5
SiC/TiC@SiO_x/TiO_2	Ball milling	-	-	665 mAh g^{-1} at 100 mA g^{-1}	54.6% after 200 cycles	100 mA g^{-1}	6
Porous Si/SiC Composite Spheres	MR	-	73.1 %	1916.3 mAh g^{-1} at 500 mA g^{-1}	87% after 100 cycles	500 mA g^{-1}	7
Pomegranate-shape-like PSi/C nanocomposites	MR	18.6%	72%	1825.8 mAh g^{-1} at 200 mA g^{-1}	65% after 100 cycles	1 A g^{-1}	This work

References

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