Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Synthesis of Complementary Hierarchical Structured Si/C Composites with High Si Content for Lithium-ion Batteries

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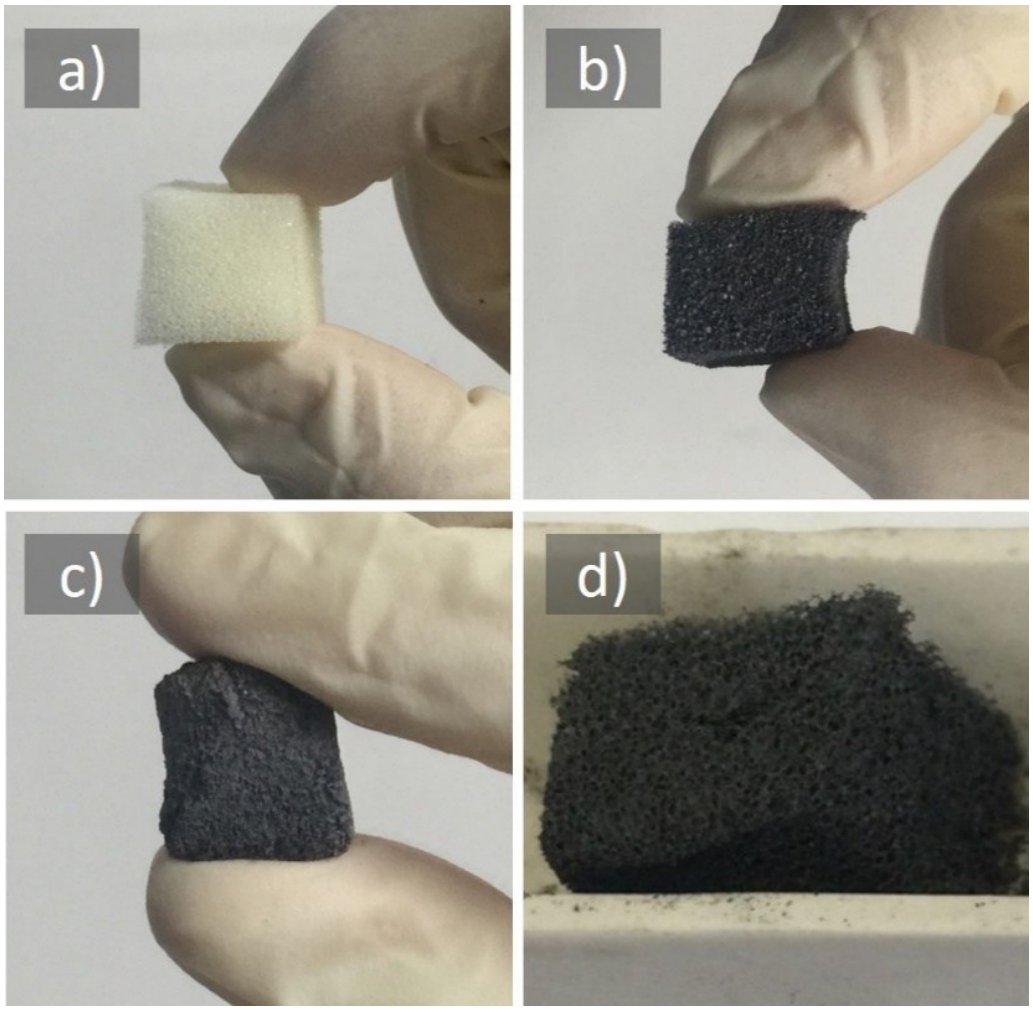

Fig. S1 Photographs of a) PU sponge; b) sponge-GS; c) $DMSiO_2G$ before heat treatment and d) $DMSiO_2G$ after heat treatment.

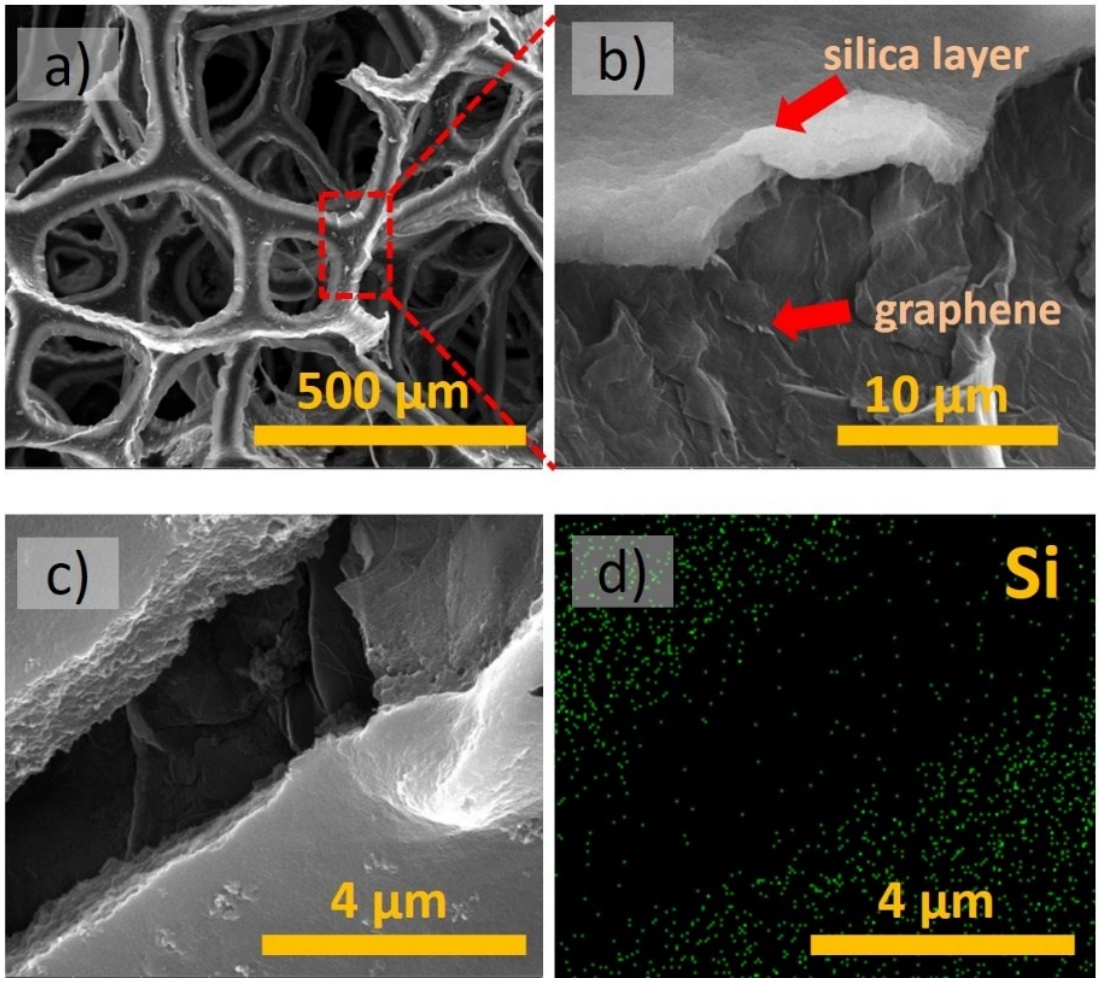

Fig. S2 a-c) SEM images of $DMSiO_2G$-RGO with different magnification. d) EDS image of $DMSiO_2G$-RGO.

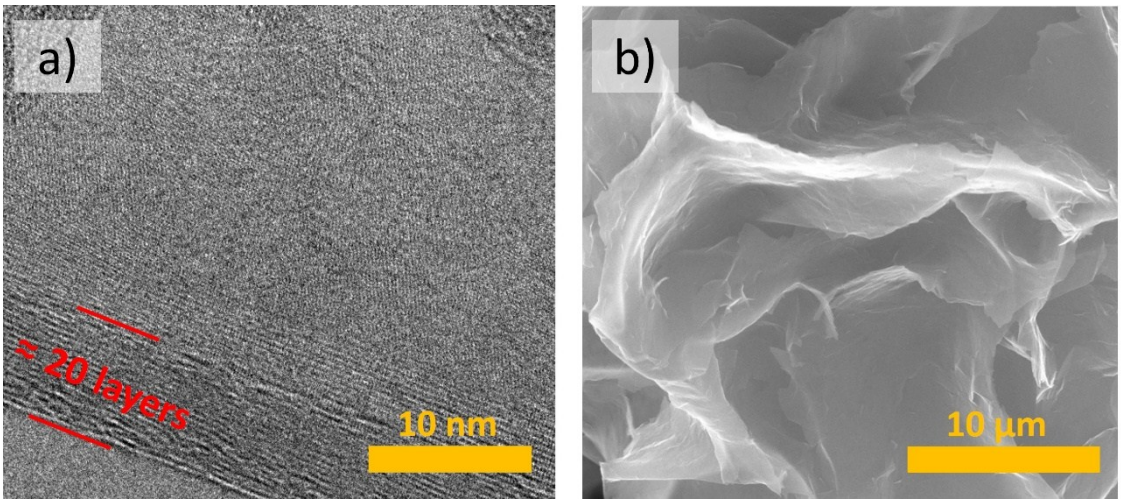

Fig. S3 a) TEM and b) SEM images of the as-prepared GN.

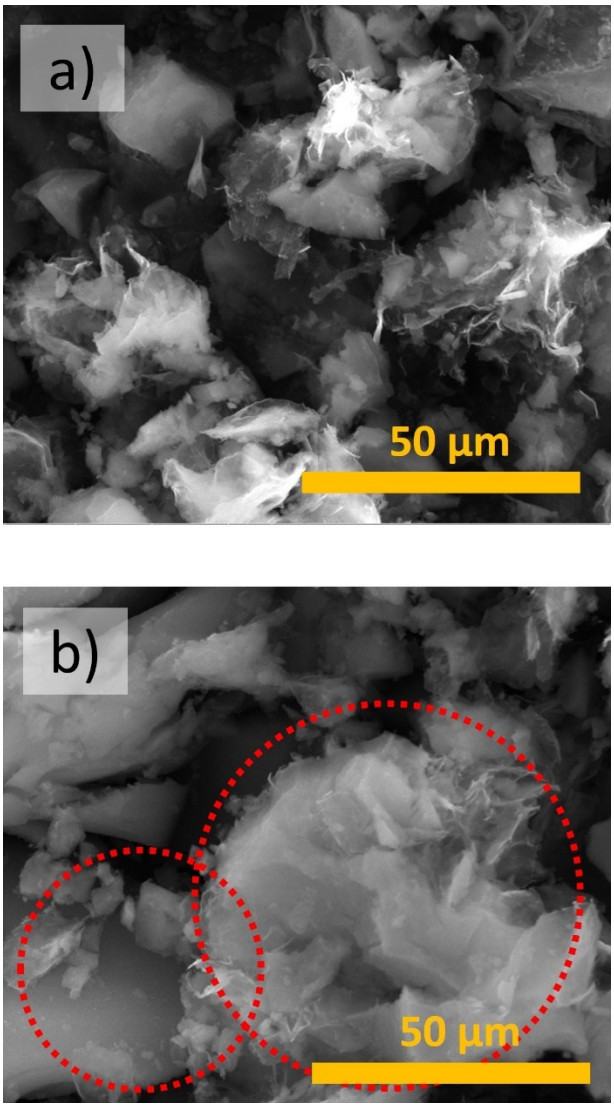

Fig. S4 a-b) SEM images of SiO_2/G with different magnifications shows the agglomeration of SiO_2.

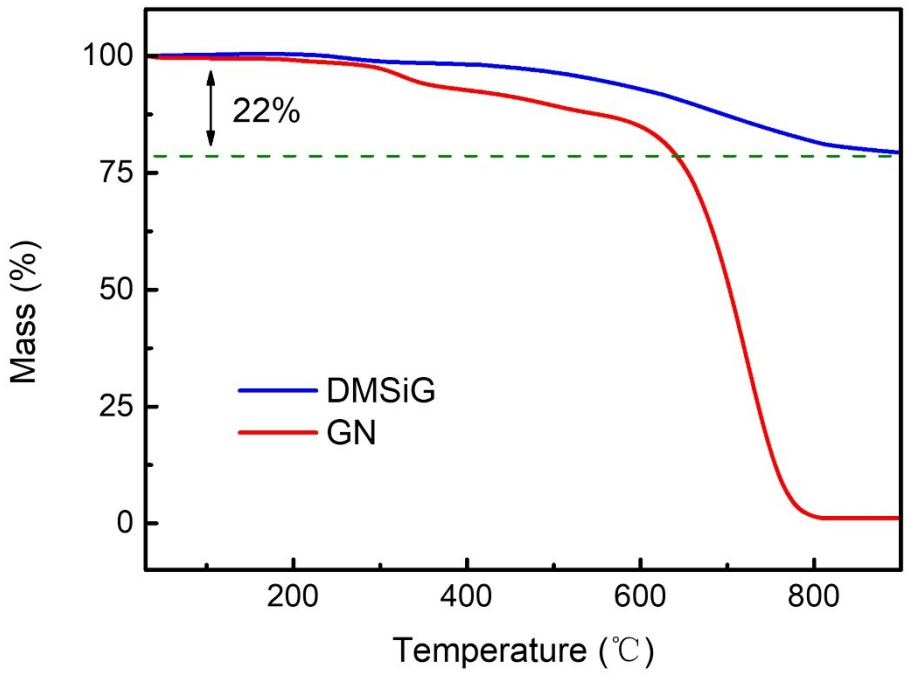

Fig. S5 TGA curves of DMSiG and GN (from room temperature to 900 °C and the rate is 10°C min^{-1}).

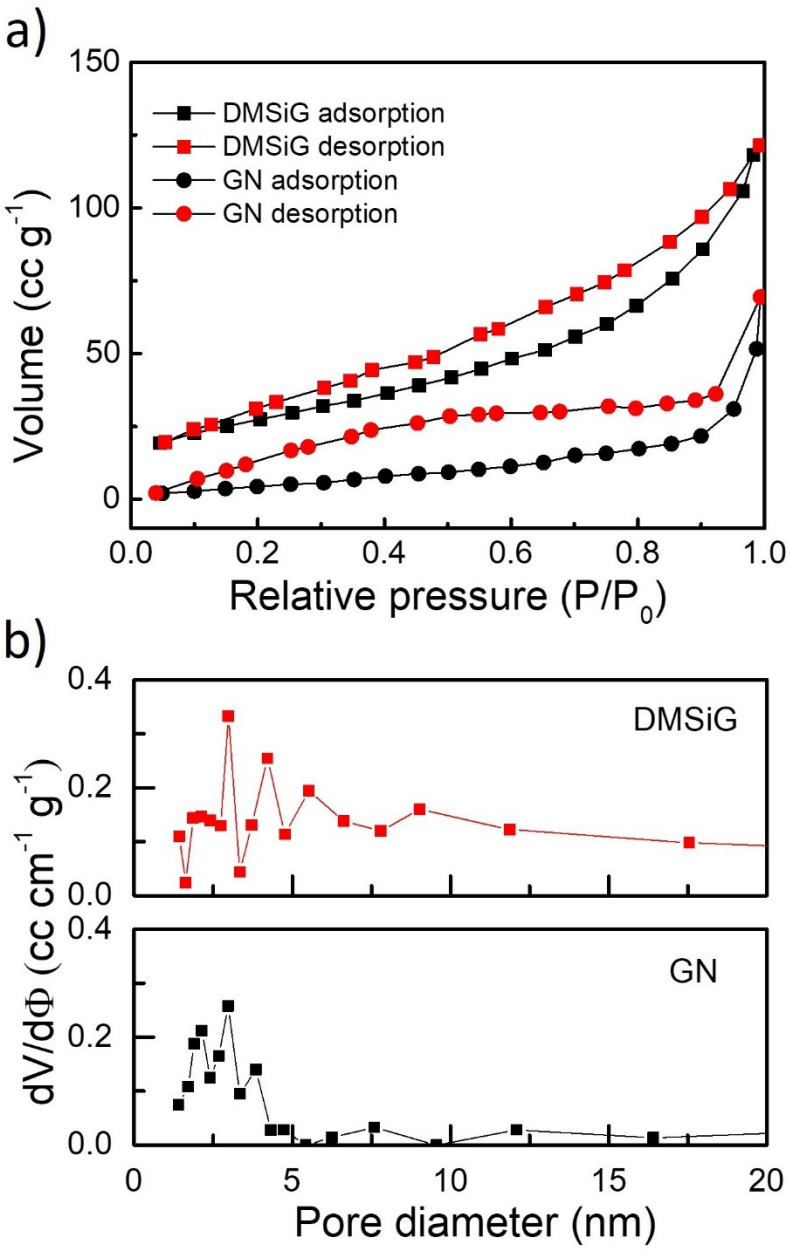

Fig. S6 a) N_2 adsorption and desorption isotherms of DMSiG and GN. b) The pore size distribution curves of DMSiG and GN.

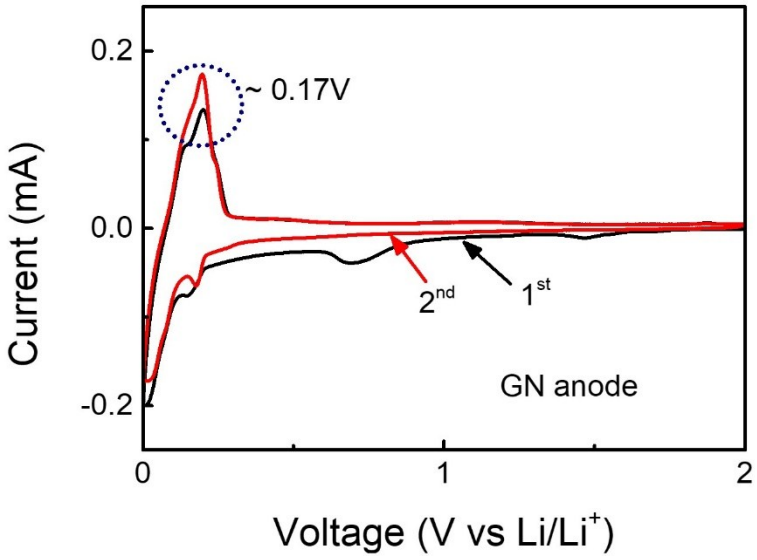

Fig. S7 CV curves of GN at a scan rate of 0.2 mV s^{-1} from 2 to 0.001 V.

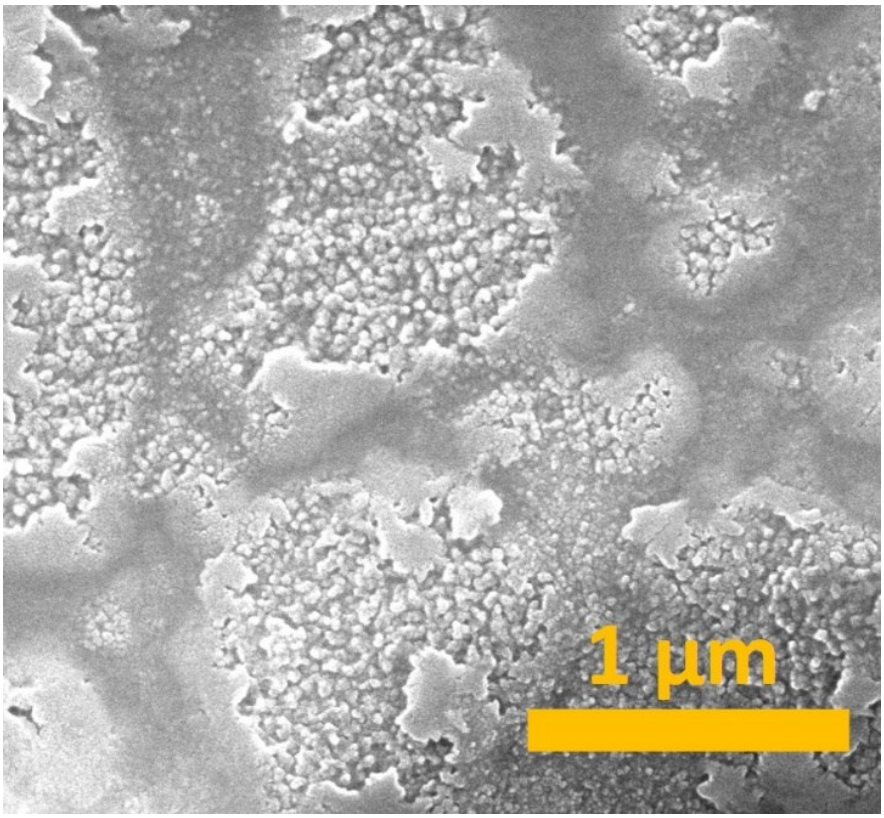

Fig. S8 SEM image of DMSiG anode after initial discharge.

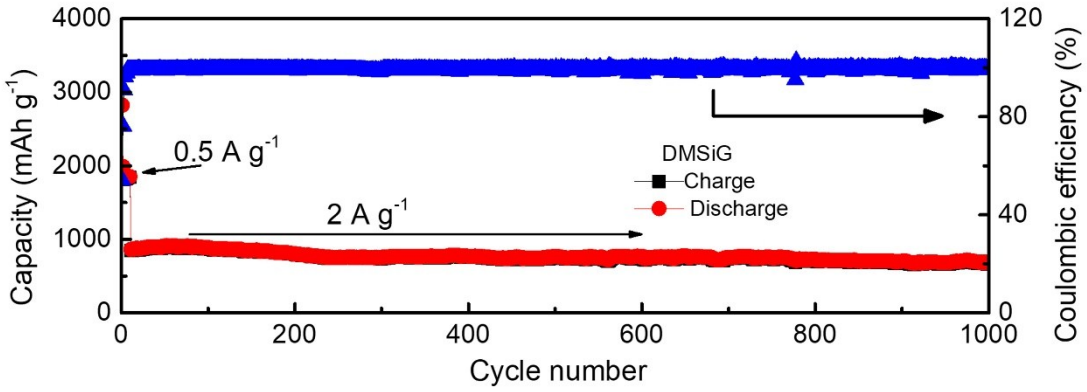

Fig. S9 Cycle performance of DMSiG at 2 A g^{-1} in 1000 cycles

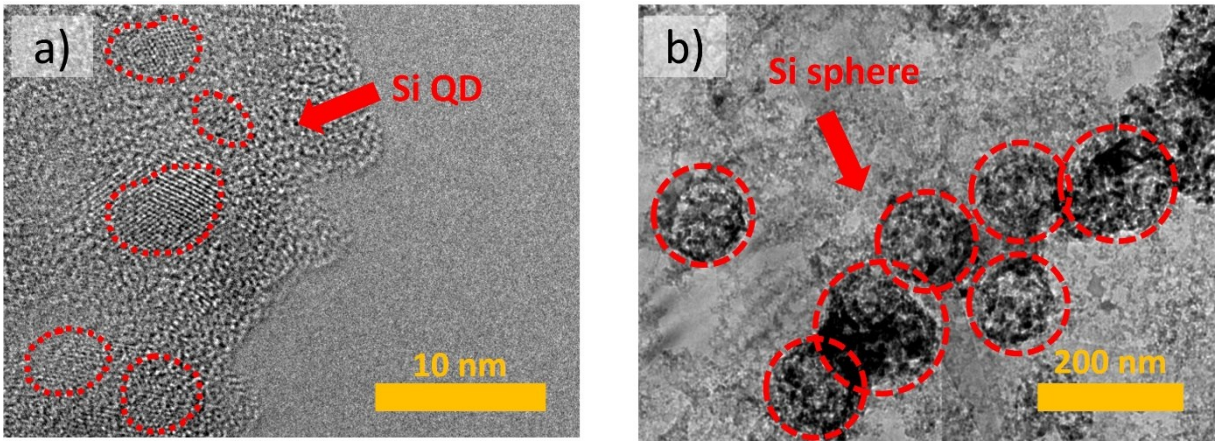

Fig. S10 a, b) TEM image of DMSiG electrode after 100 cycles.

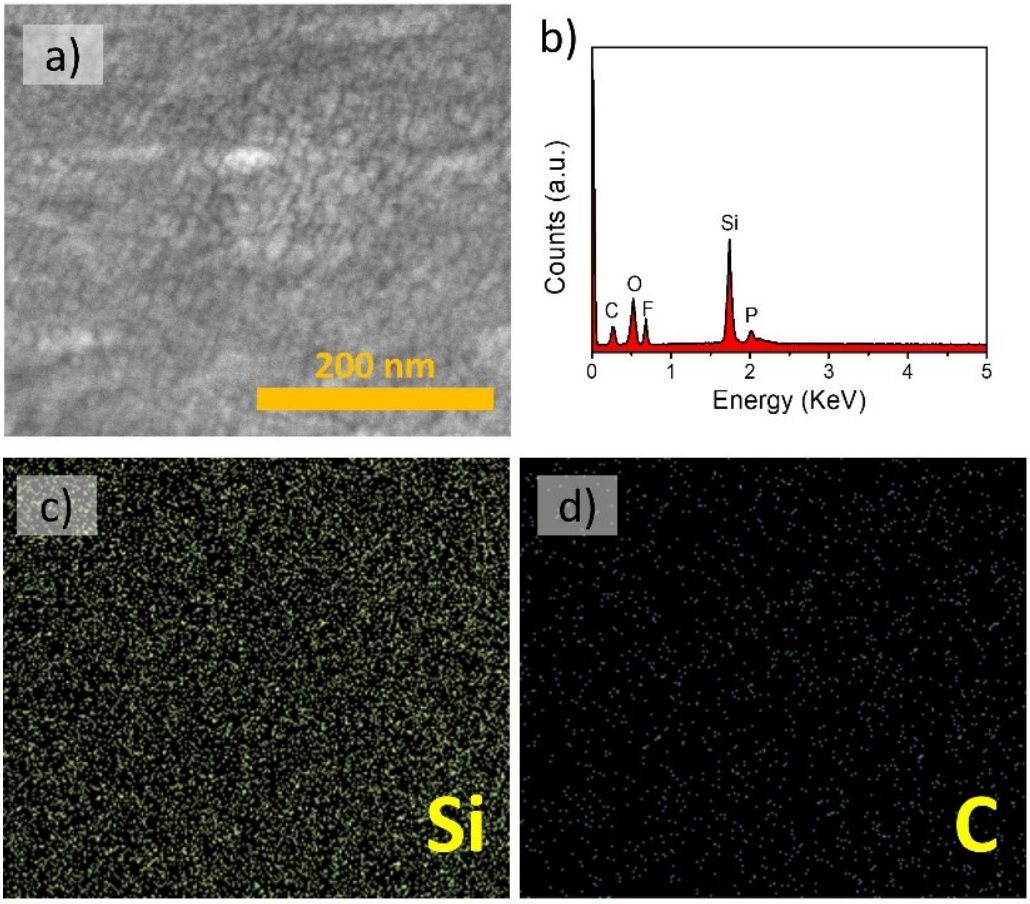

Fig. S11 (a) SEM image of DMSiG electrode after 100 cycles. (b) the corresponding EDS analysis, and the EDS mapping of (c) silicon, (d) carbon.

Table S1. The electrochemical performances of different silicon-carbon composites.

Composites	Silicon contents (wt.%)	Current density (A g^{-1} or C)	Reversible capacity (mAh g^{-1})	Ref
Interconnected Porous Silicon/Carbon Composites	35.9	0.05	1437	S1
Mesoporous Si/C Nanocomposite	43	0.5	1864	S2
3D Graphene-Silicon network	66.8	0.2	2450	S3
3D silicon/carbon nanotube capsule	75	0.5	1226	S4
Silicon/TRG	82	0.2	1153	S5
Si@crumpled graphene	60	1	940	S6
DMSiG (This work)	**78**	**0.1**	**1585.6**	

References

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S2. R. Zhang, Y. Du, D. Li, D. Shen, J. Yang, Z. Guo, H. K. Liu, A. A. Elzatahry, D. Zhao, *Adv. Mater.*, 2014, 26, 6749-6755.

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