Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supplementary Information for

A Three-dimensional Multilayered SiO-graphene Nanostructures as Superior Anode Material for Lithium-ion Batteries

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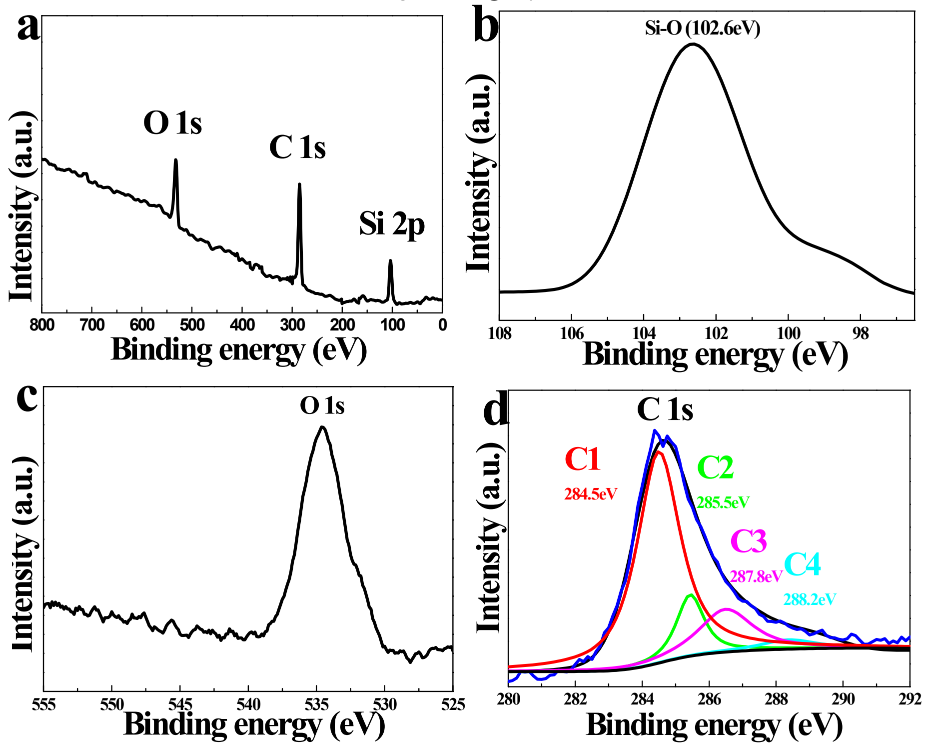

Figure S1. (a) the survey XPS spectrum of 3D SiO-RGO nanostructures; (b), (c) and (d) the high-resolution XPS spectra of Si 2p, O 1s, and C 1s, respectively.

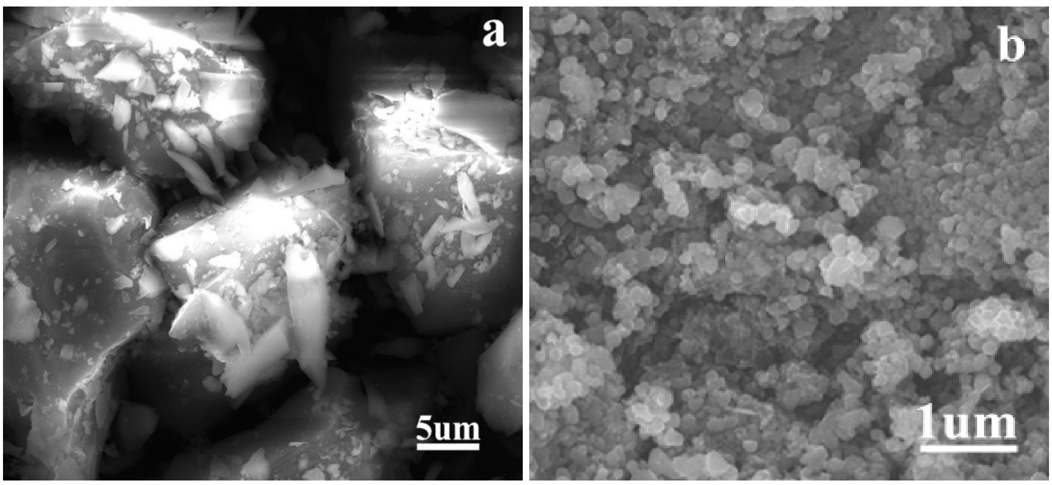

Figure S2. FESEM image of (a) as-received SiO powder and (b) SiO NPs.

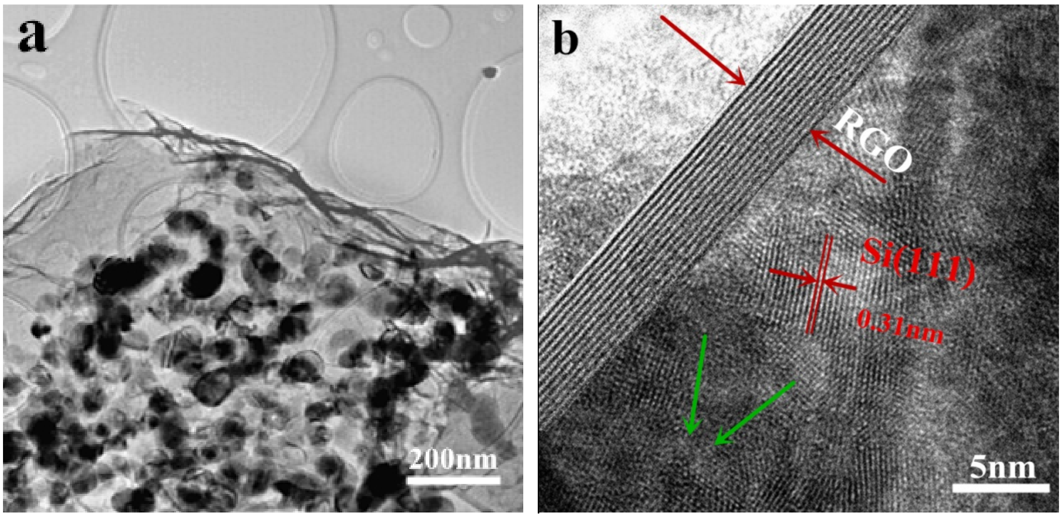

Figure S3. (a) TEM image and (b) HRTEM of 3D SiO-RGO nanostructures.

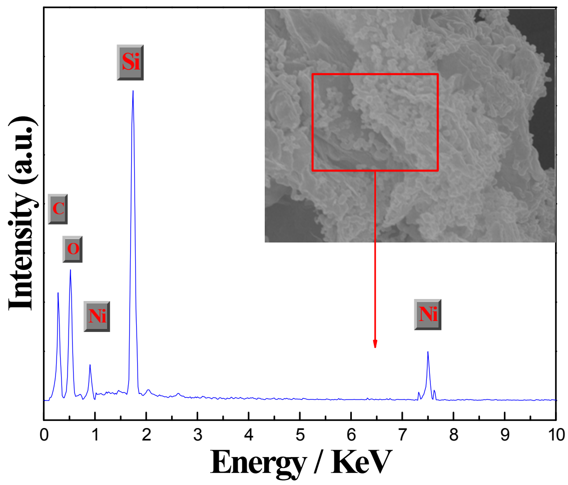

Figure S4. EDAX spectra from the surface of 3D SiO-RGO nanostructures.

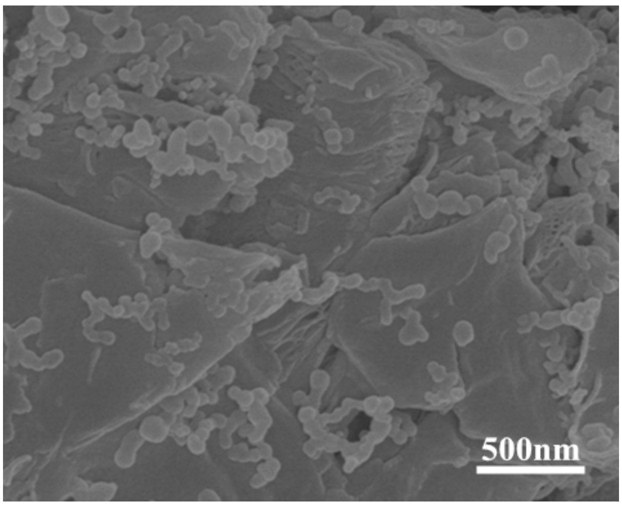

Figure S5. FESEM image of 3D SiO-RGO after 100 cycles under a current density of 100 mA g^{-1}.

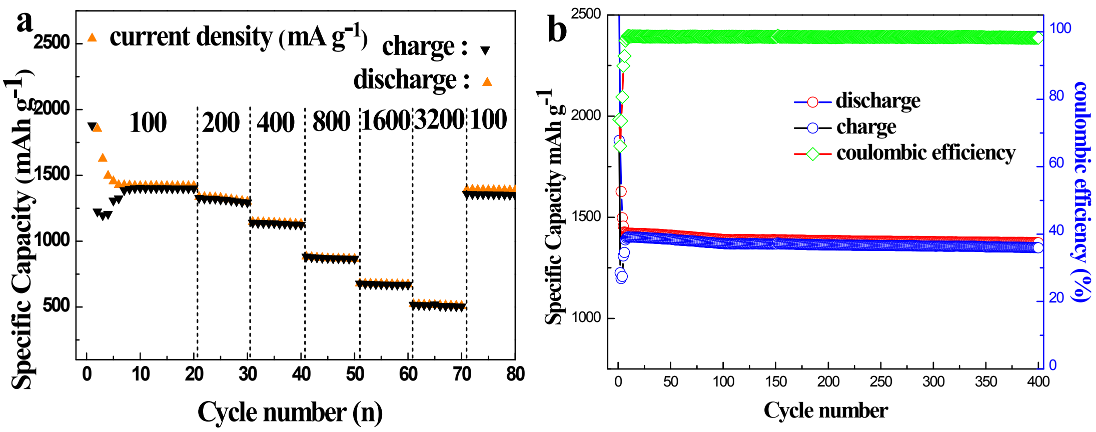

Figure S6 (a) Cycling performances of 3D SiO-RGO under different current densities; (b) Superior cycle stability of 3D SiO-RGO in the long-run up to 400 cycles under a current density of 100 mA g^{-1}. (blue: discharge capacity; orange: charge capacity; green: coulombic efficiency).

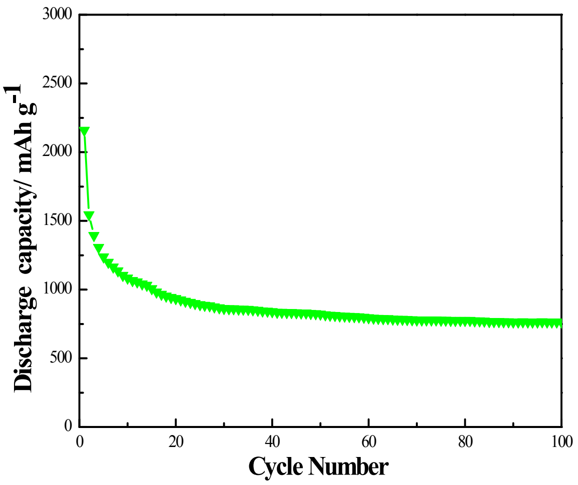

Figure S7 Cycling performance of SiO-RGO nanocomposites as anode material at a current density of 100 mA g^{-1}. For the preparation of SiO-RGO nanocomposites electrode, multilayered SiO-RGO film was carefully stripped off from Ni foam matrix. Electrochemical properties of the products were measured using CR2025 coin cells. Electrodes were prepared by casting the slurry consisting of 80% active material, 10% sodium carboxymethyl cellulose (CMC), and 10% acetylene black onto a copper foil. The fabrication process of cells can be found elsewhere [1]. In comparison with 3D SiO-RGO electrode, it is found that SiO-RGO nanocomposites electrode showed the inferior cycling performance, with a reversible capacity of 764 mAh g^{-1} after 100 cycles at the current density of 100 mA g^{-1}. This result confirmed that in comparison with the conventional Cu current collector, the 3D porous Ni foam current collector with a large surface area, good electrical conductivity, strong mechanical characteristic and high flexibility could improve the cycling performance of SiO-RGO nanocomposites dramatically.

REFERENCE

[1] S. Liang, X. Zhu, P. Lian, *Journal of Solid State Chemistry,* 2011, 184, 1400.