A carob-inspired nanoscale design of yolk-shell Si@void@TiO_2-CNFs composite as anode material for high performance lithium-ion batteries

Chenle Zhang,[a,b] Jingbo Yang,[a] Hongwei Mi,[a,c] Yongliang Li,*[a,c] Peixin Zhang [a,c] and Han Zhang [b]

a. College of Chemistry and Environmental Engineering, Shenzhen University, Shenzhen, Guangdong 518060, P. R. China

b. International Collaborative Laboratory of 2D Materials for Optoelectronics Science and Technology of Ministry of Education, Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education and Guangdong Province, Shenzhen University, Shenzhen 518060, P. R. China

c. Guangdong Flexible Wearable Energy and Tools Engineering Technology Research Centre, Shenzhen University, Shenzhen 518060, P. R. China

** E-mail: liyli@szu.edu.cn; Fax: +86-755-26558134; Tel: +86-755-26536627*

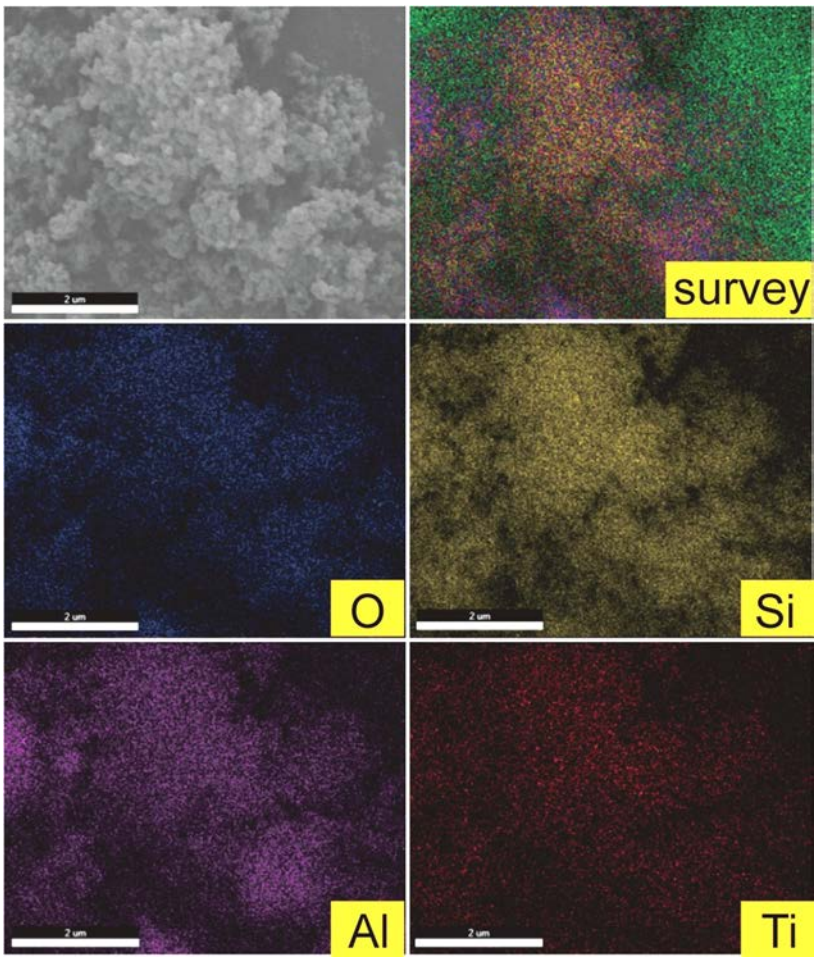

Fig. S1 Elemental mapping of the $Si@Al_2O_3@TiO_2$ NPs composite.

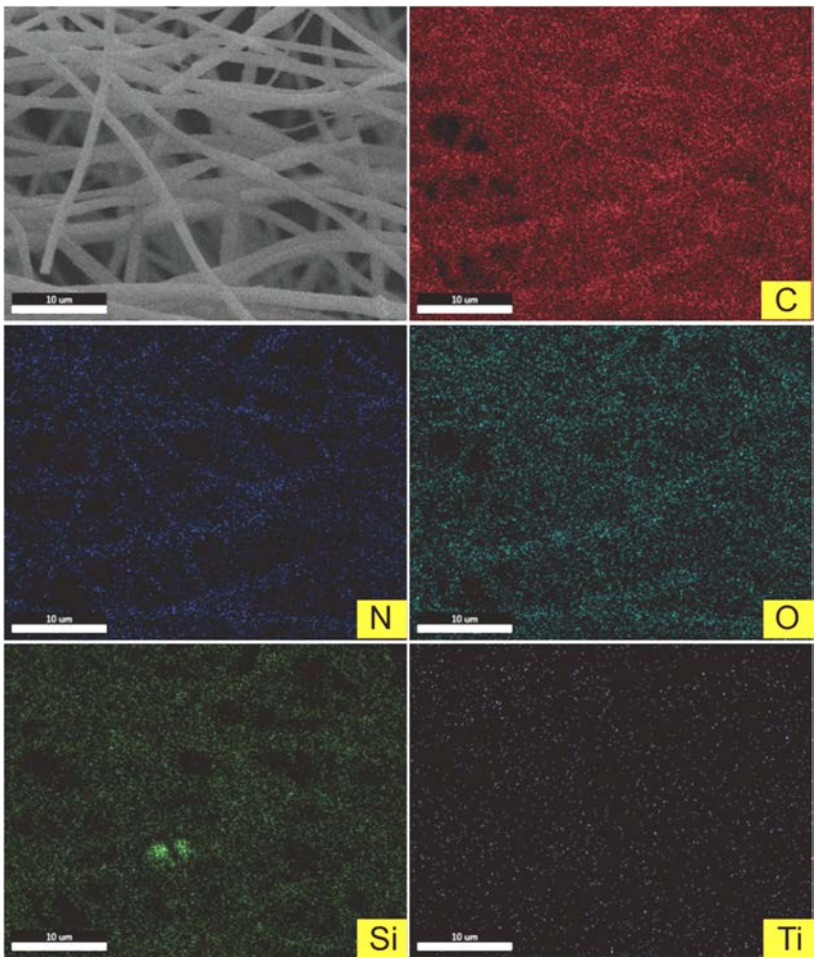

Fig. S2 Elemental mapping of the Si@void@TiO_2-CNFs composite.

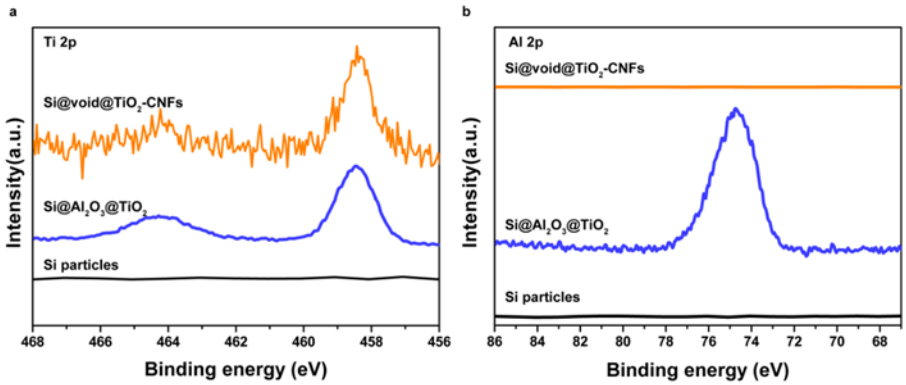

Fig. S3 XPS spectra of (a) Ti 2p and (b) Al 2p in Si particles, $Si@Al_2O_3@TiO_2$ and $Si@void@TiO_2$-CNFs.

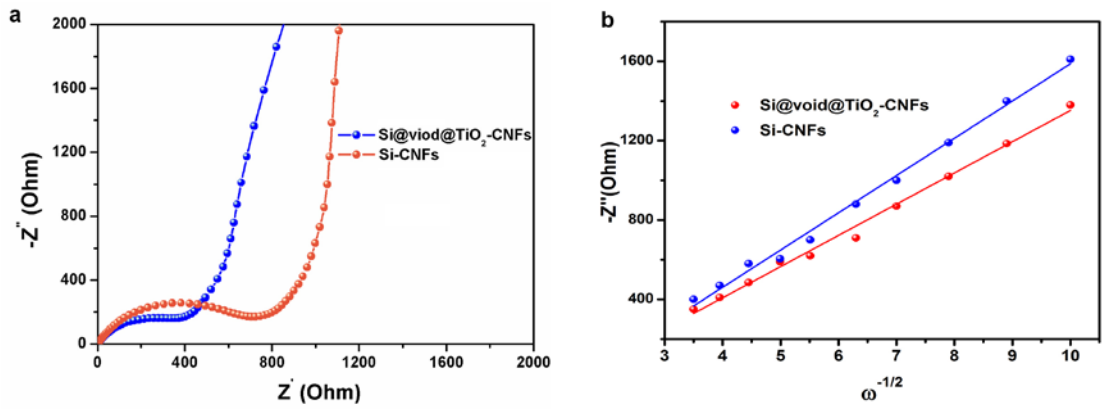

Fig. S4 (a) Nyquist impedance plots and (b) the corresponding relationship between –Z" and $\omega^{-1/2}$ in the low frequency region for Si-CNFs and Si@void@TiO_2-CNFs.

Table S1. Comparison of the electrochemical performance of Si-based yolk-shell structured composite electrodes reported in the literature.

Materials	*Current density/mA g^{-1}*	*Reversible Capacity/mAh g^{-1}*	*Cycling number*	*Ref.*
Si@C@void@C	2000	1040	500	1
YS Si@50*m*C	420	1000	400	2
2D-Si@gC	4000	1275	200	3
Si@C@ZIF-67-800N	1000	852	300	4
p-SiNPs@HC	200	1400	100	5
carbon@void@silicon	5000	750	1000	6
Si@Void@C	1000	804	50	7
Si@C@void@C	1000	630	500	8
SiNP@void@C	4200	1500	1000	9
carbon@void@silicon	250	1100	200	10
Si@void@TiO_2-CNFs	**600** **9600**	**1156** **485**	**500** **2000**	**This work**

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