

## Supplementary material

### **Sn-encapsulated N-doped porous carbon fibers for enhancing lithium-ion battery performance**

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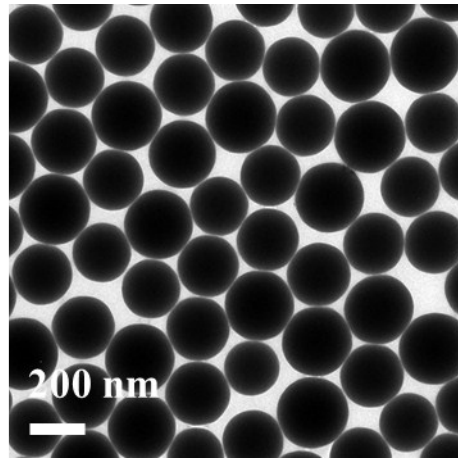


Figure S1. The TEM images of SiO<sub>2</sub>.

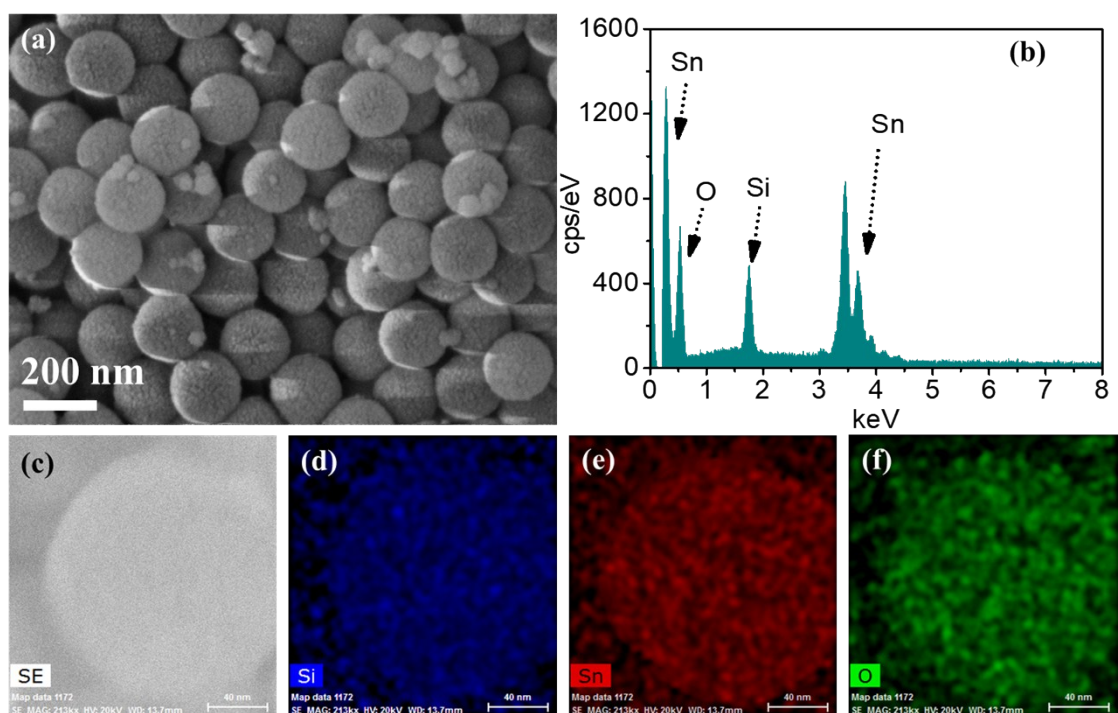


Figure S2. (a) The SEM images of  $\text{SiO}_2/\text{SnO}_2$ , (b) The EDS analysis of Sn/NPCFs-0.5, (c-f) EDS mappings of (d) Si, (e) Sn and (f) O from panel c.

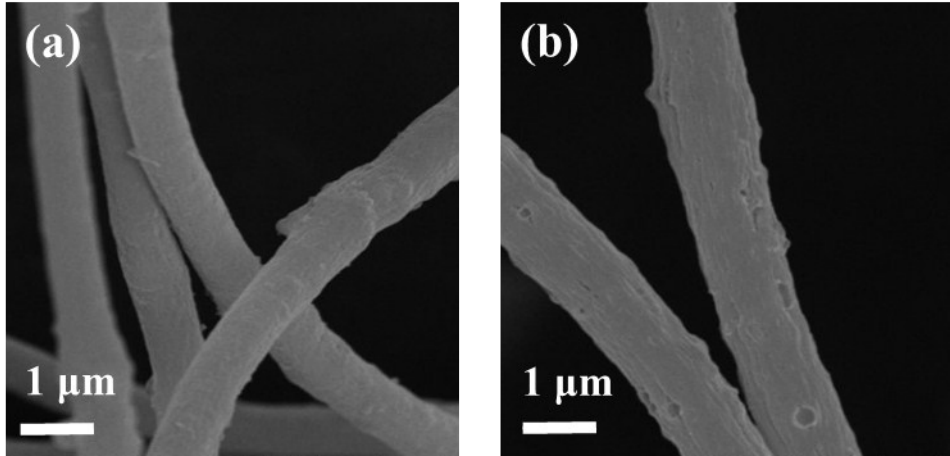


Figure S3. (a-b) The SEM images of Sn/NPCFs-0.2 and Sn/NPCFs-1.

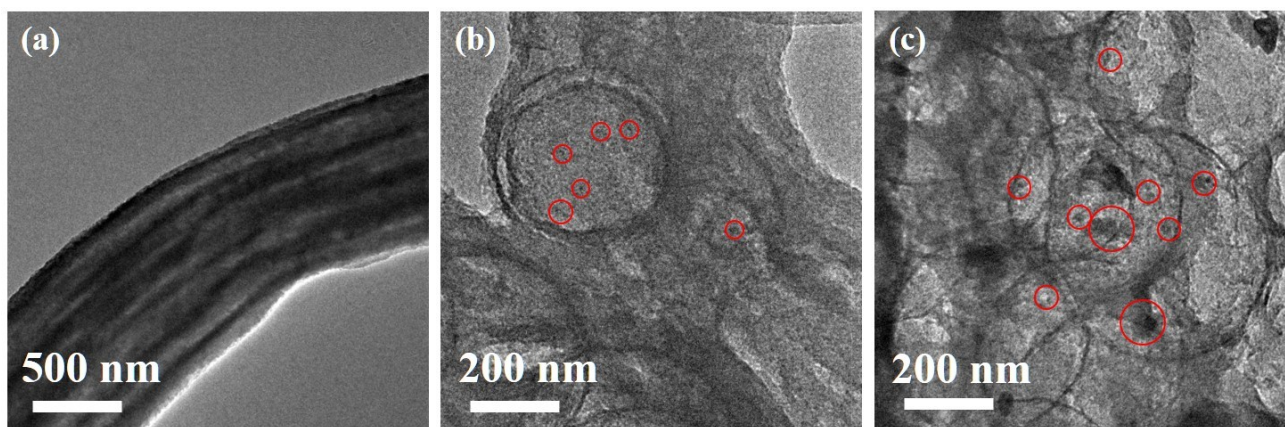


Figure S4. The TEM images of (a) NPCFs; (b) Sn/NPCFs-0.2; (c) Sn/NPCFs-1.

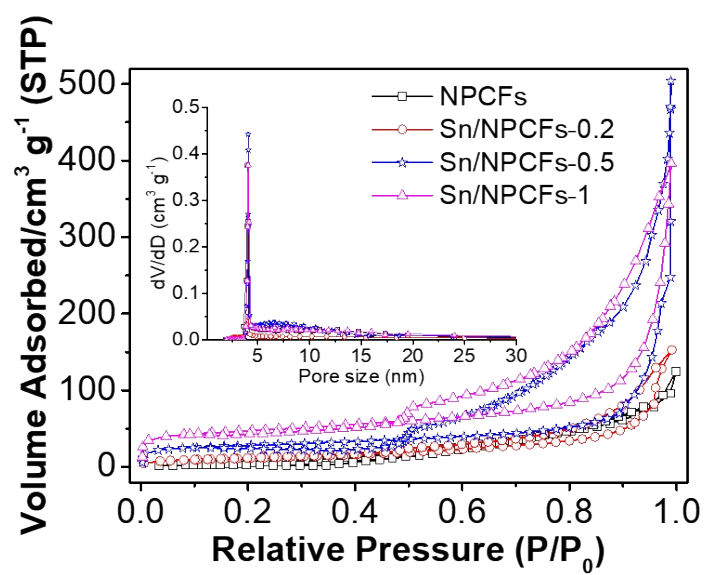


Figure S5. Nitrogen adsorption-desorption isotherms (Inset is the corresponding pore size distribution.).

Table S1. N<sub>2</sub> sorption isotherms and the corresponding pore size distribution of NPCFs and Sn/NPCFs.

Sample	The best size of pores(nm)	BET surface area (m <sup>2</sup> g <sup>-1</sup> )	volume of pores (cm <sup>3</sup> g <sup>-1</sup> )
NPCFs	3.30	40.99	0.2390
Sn/NPCFs-0.2	3.97	43.95	0.2618
Sn/NPCFs-0.5	4.05	93.55	0.9008
Sn/NPCFs-1	4.03	155.4	0.6716

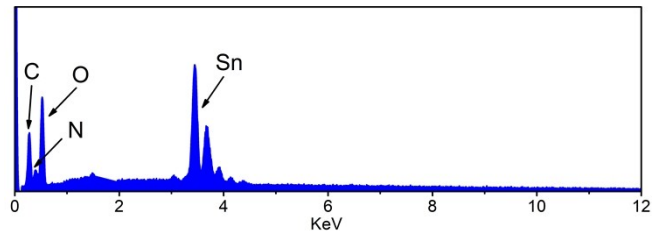


Figure S6. The EDS analysis of Sn/NPCFs-0.5.



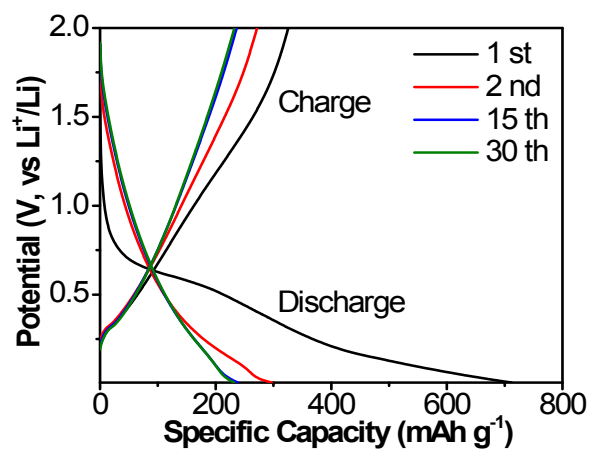


Figure S7. Charge and discharge curves of NPCFs with a current density of 500 mA g<sup>-1</sup>.

Table S2. Cycling performance and capacity of Sn/carbon nanomaterials reported in previous works

Materials	Synthesis method	Electrochemical performance			Ref.
		Current density	Cycle number	Capacity retention	
Sn	One-step reduction method	200 mA g <sup>-1</sup>	50	< 50 mAh g <sup>-1</sup>	[1]
Sn/C	Annealing	100 mA g <sup>-1</sup>	100	200 mAh g <sup>-1</sup>	[2]
Sn/Graphene 90 wt.% Sn	Microwave reaction	100 mA g <sup>-1</sup>	20	400 mAh g <sup>-1</sup>	[3]
Sn-C Composite	Calcination	100 mA g <sup>-1</sup>	100	450 mAh g <sup>-1</sup>	[4]
CF/Sn SnO <sub>2</sub> @C	Carbothermic reduction	100 mA g <sup>-1</sup>	50	657.6 mAh g <sup>-1</sup>	[5]
0.2 Sn-1200	Electrospinning and pyrolysis	70 mA g <sup>-1</sup>	100	400 mAh g <sup>-1</sup>	[6]
Sn@C/C (I) nanofibers using flow ratio of 1:3	Electrospinning	50 mA g <sup>-1</sup>	50	456 mAh g <sup>-1</sup>	[7]
Sn-SnO <sub>2</sub> /C composite nanofibers	Electrospinning composite nanofibers	400 mA g <sup>-1</sup>	10	390 mAh g <sup>-1</sup>	[8]
SCNF	Electrospinning	100 mA g <sup>-1</sup>	10	550 mAh g <sup>-1</sup>	[9]
Sn- encapsulated carbon fibers	Electrospinning and carbonization	100 mA g <sup>-1</sup>	6	750 mAh g <sup>-1</sup>	This work
Sn- encapsulated carbon fibers	Electrospinning and carbonization	500 mA g <sup>-1</sup>	100	400 mAh g <sup>-1</sup>	This work

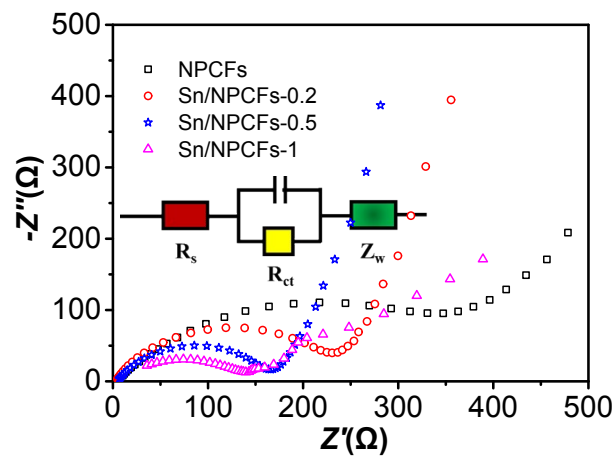


Figure S8. Electrochemical impedance spectra of the NPCFs, Sn/NPCFs-0.2, Sn/NPCFs-0.5, Sn/NPCFs-1.

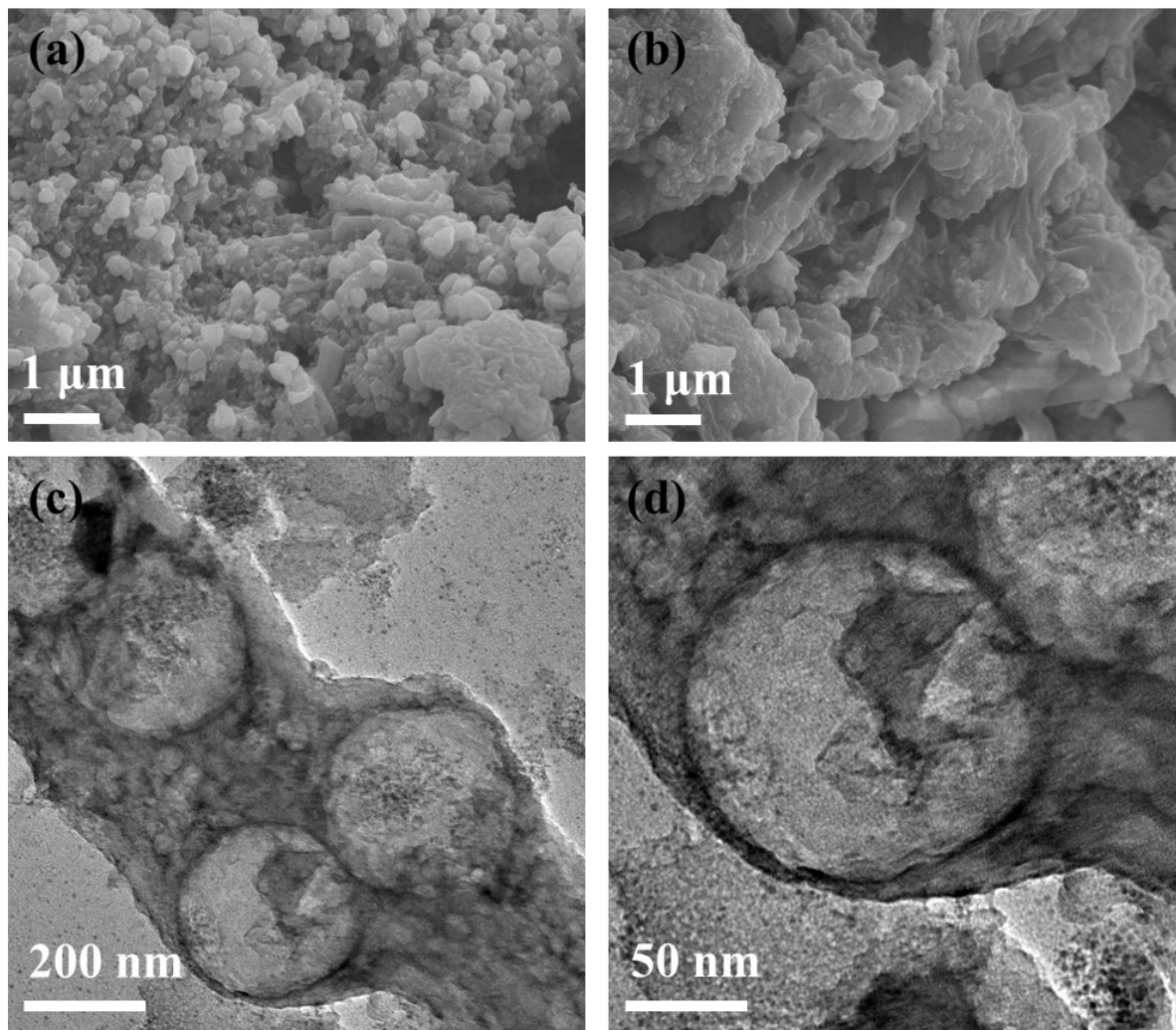


Figure S9. (a) SEM image of the as-prepared Sn/NPCFs-0.5 electrode. (b) SEM, (c-d) TEM images of the Sn/NPCFs-0.5 after 5 cycles.

## References

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