Supporting Information

Ultrathin Phyllosilicate Nanosheets as Anode Material with Superior Rate Performance for Lithium Ion Batteries

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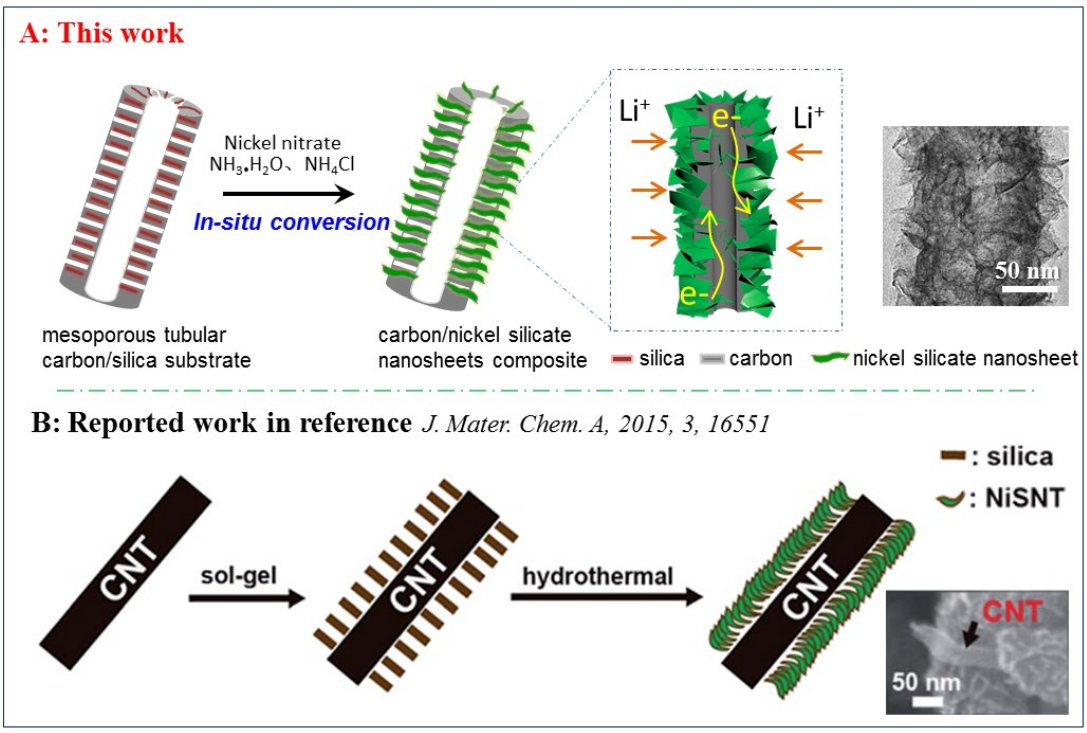


Scheme S1. Schematic illustration for the growth strategies of nickel silicates on substrate (a) in this work and (b) previous reported work.

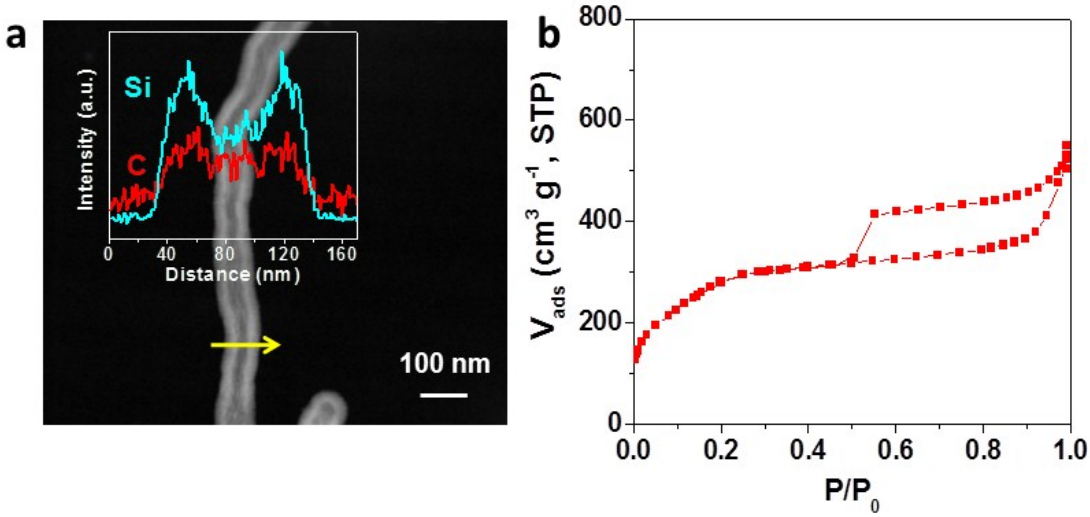


Figure S1. (a) STEM image and the linear EDX element distributions of carbon (C) and silicon (Si) of tubular mesoporous carbon/silica composite. (b) N_2 adsorption-desorption isotherm of carbon/silica composite.

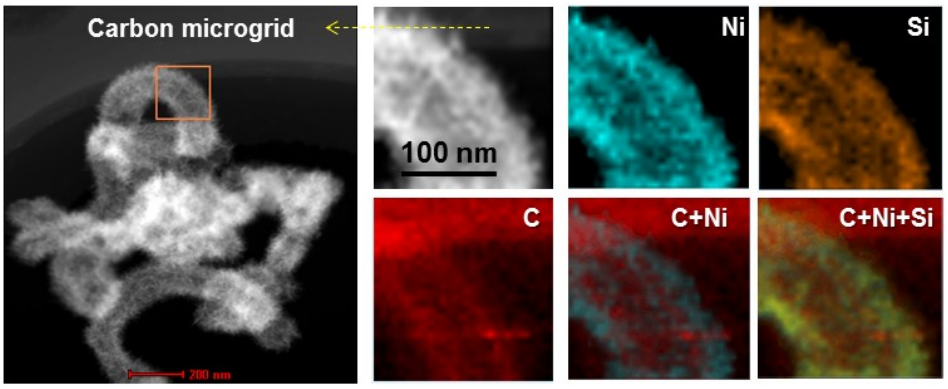


Figure S2. HAADF-STEM image of the CNSF and the corresponding EDS mapping of C, Ni, and Si elements.

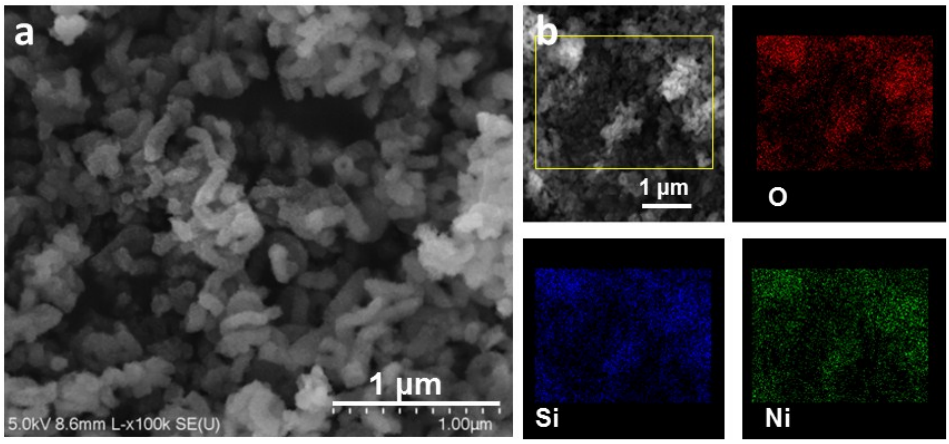
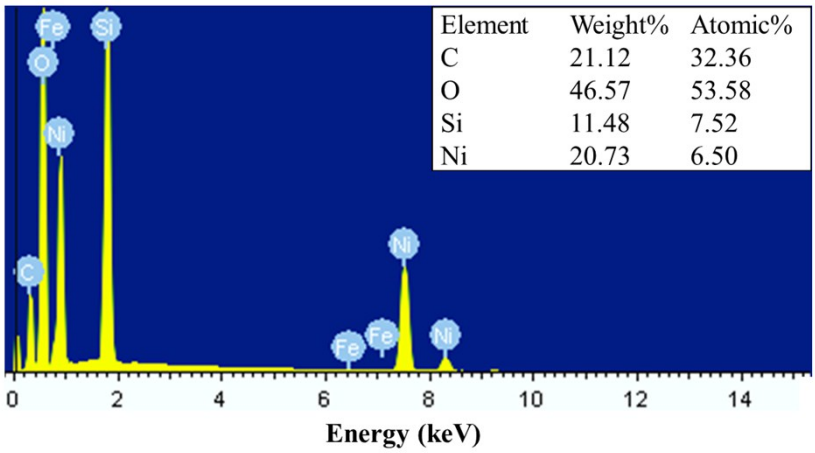


Figure S3. (a) SEM image and (b) EDX mapping of bare NSF.



Element	Weight%	Atomic%
C	21.12	32.36
O	46.57	53.58
Si	11.48	7.52
Ni	20.73	6.50

Figure S4. EDX spectrum of CNSF material. Inset shows the elements ratios. Comments: A trace amount of Fe (Fe/Ni weight ratio=0.0048) was present due to the contamination in the product.

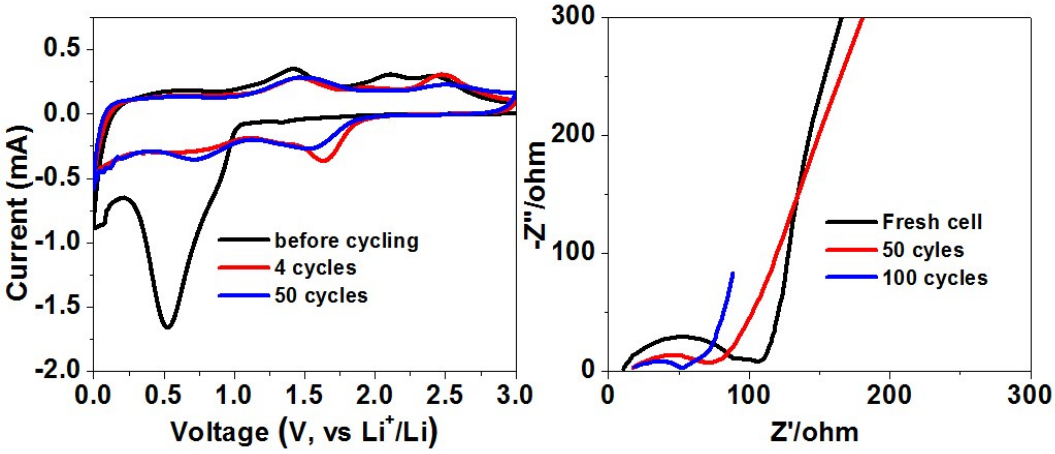


Figure S5. (a) CV curves and (b) EIS spectra of CNSF.

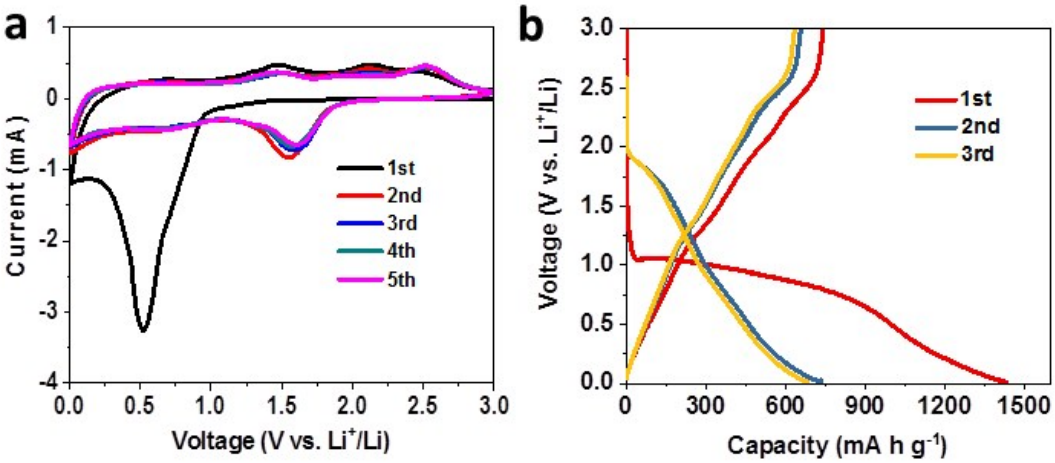


Figure S6. (a) CV curves and (b) GC profiles of bare NSF.

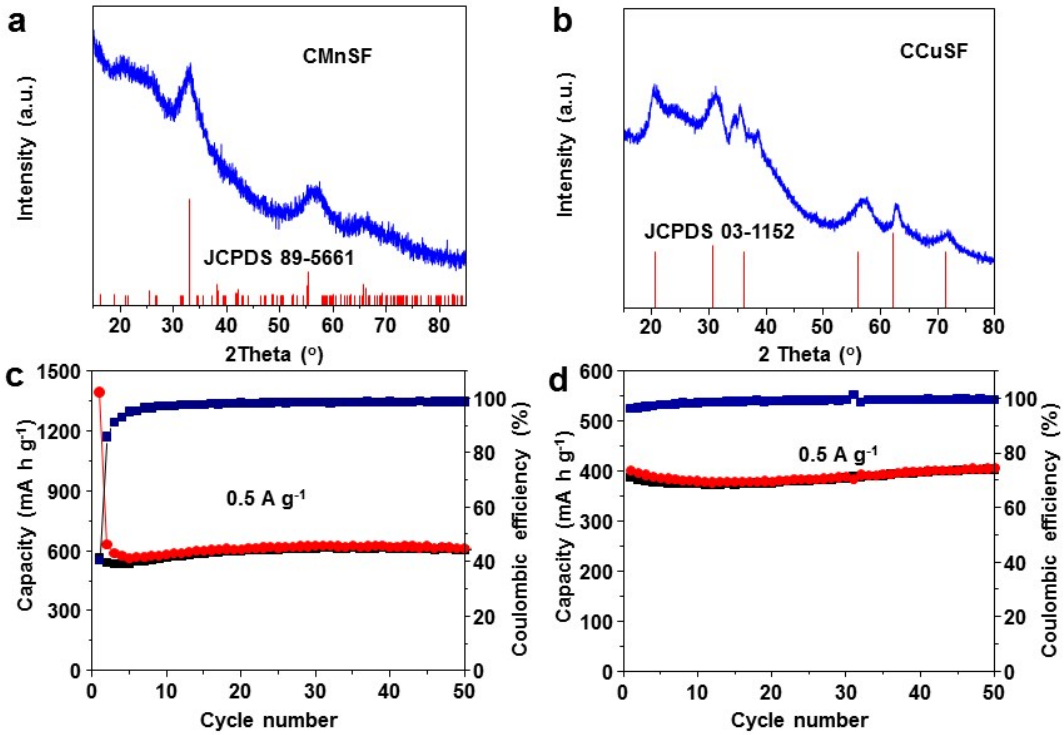


Figure S7. XRD patterns and electrochemical performance of (a,c) carbon-incorporated manganese silicate (CMnSF) and (b,d) carbon-incorporated copper silicate (CCuSF).

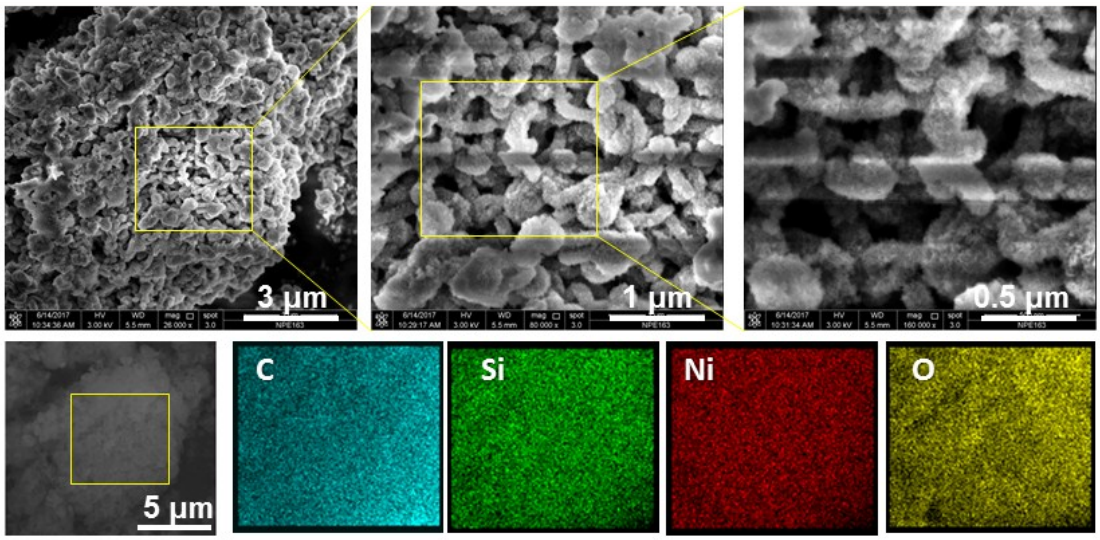


Figure S8. SEM images and EDX mapping of CNSF after cycles.

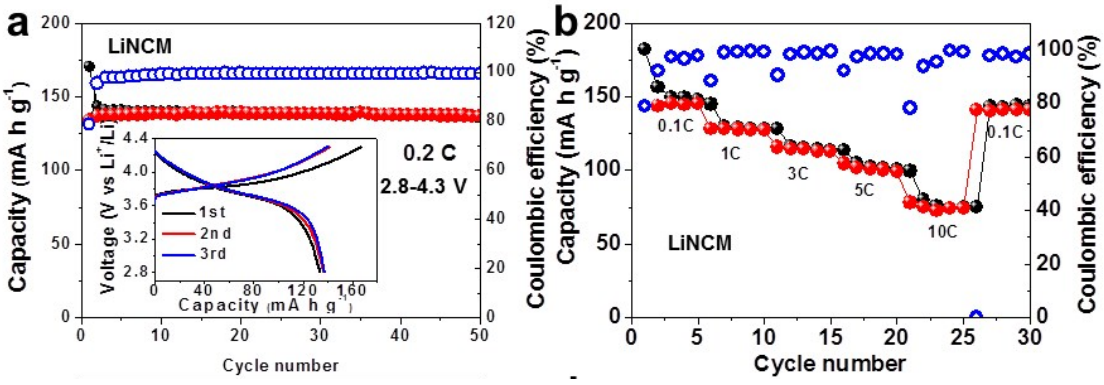


Figure S9. (a). Cycling performance of commercial $LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$ (LiNCM) cathode at 0.2 C with corresponding charge/discharge profiles as inset. (b) Rate capacity of LiNCM cathode.

Table S1. The reported performance of nickel silicates anodes for lithium ion batteries and the results in this study.

Samples	Initial coulombic efficiency	Initial charge capacity	Cyclic stability	Rate capability	Ref.
CNSF	70.7%@0.05	1181	585@1.0 (200th)	1145@0.05 1107@0.1 1017@0.2 876@0.5 730@1.0 540@2.0	This work
Ni-HNs	42%@0.2[a]	500[a]	673.8@0.2 (300th)	~700@0.1[a] 550@0.3 400@1.0	1
NiO/NiSiO nanoflowers	46.7%@0.05	672	126[b]@0.05 (50th)	NG[c]	2
Nickel silicate nanoplates on RGO	59%@0.05	730[a]	797@0.05 (50th)	656@0.1 601@0.2 534@0.5 484@1.0	3
rGO/NiSiO/Ni	NG[c]	698	478@0.02 (60th)	~500@0.05 420@0.1	4
rGO/NiSiO	44%@0.02	758	380.5@0.02 (60th)	~400@0.05 280@0.1	
CNT@NiSiOx	71.5%@0.05	770	489@0.05 (50th)	387@0.1 293@0.2 210@0.5 157@1.0	5
RGO wrapped NiSiO hollow spheres	66.3%@0.2	1024	400@0.5 (1000th)	592@0.1 488@0.2 407@0.5 275@1.0 143@2.0	6
$Ni_3Si_2O_5(OH)_4$ nanotube	45.5%@0.02	639	227@0.02 (21th)	NG[c]	7
Copper Silicate Hydrate /RGO	45.5%@0.2	1100	747@1.0 (1st) 431@1.0 (2nd) 429@1.0 (800th)	571@0.05 522@0.1 460@0.2 398@0.5 357@1.0	8
cobalt silicate nanobelts@carbon (20.9wt% carbon)	53.3@0.08	620.9	686.4@0.5 (100th) 450@0.5 (1000th)	745@0.1 688@0.2 580@0.5	9

				478@1.0 360@2.0	
Zn_2SiO_4 urchin-like microspheres	57.5@0.05	532	413@0.05 (20th)	NG	10
fayalite (a-Fe_2SiO_4)@C	60.6@0.1C	514.5	376.7@1.0C (100th)	514.5@0.1C 465.3@0.2C 428.7@0.5C 412.6@1.0C 384.5@2.0C 372.4@3.0C	11
a, Values estimated from Graph；b, Lithiation capacity；c, Not given					

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