Modified cellulose-based separator with high transference number and uniform lithium deposition for dendrite-free lithium metal batteries

Chao Gao[a#], Lianghong Wu[b#], Yulin Lu[a], Hang Sun[a], Yun Li[a], Weiwei Liu[a], Jinlan Luo[c*] ，Changyong Song[d*]

a.   Shandong Open University, Jinan, China, 250014

b.   Jinan Thermoelectric Engineering Co., Ltd. Jinan, China, 250022.

c.   Center for Advanced Low-dimension Materials State Key Laboratory for Modification of Chemical Fibers and Polymer Materials College of Chemistry and Chemical Engineering Donghua University Shanghai, China, 201600

d.   State Key Laboratory of Heavy Oil Processing, School of Materials Science and Engineering, China University of Petroleum (East China), Qingdao, China, 266580

# Chao Gao and Lianghong Wu contributed equally to this work

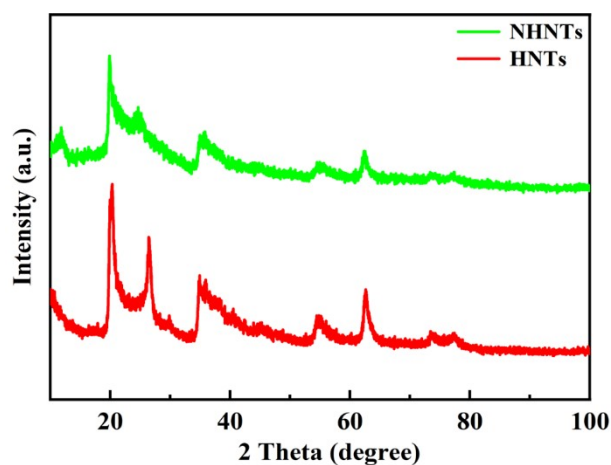* Changyong Song and Jinlan Luo are Corresponding authors.
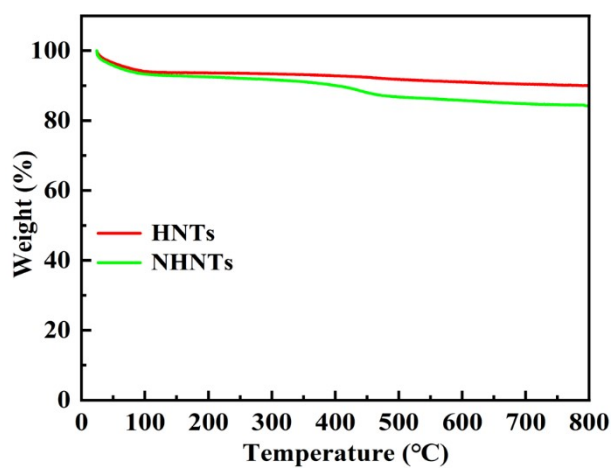
Figures

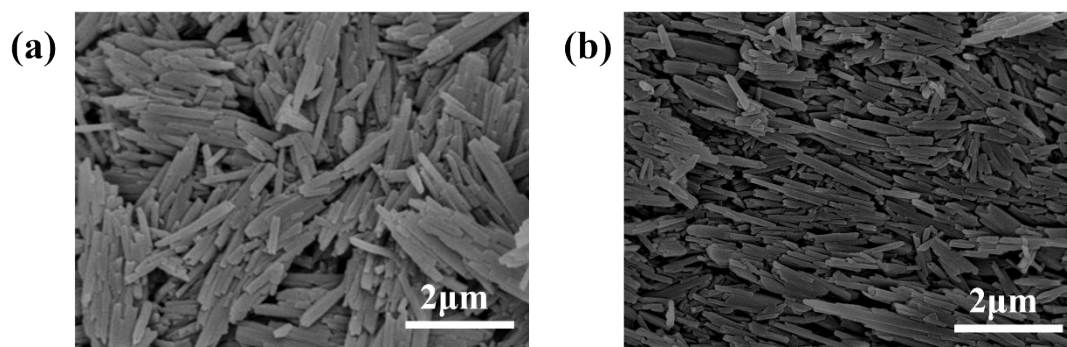
Fig.S1 XRD spectra of HNTs and NHNTs.

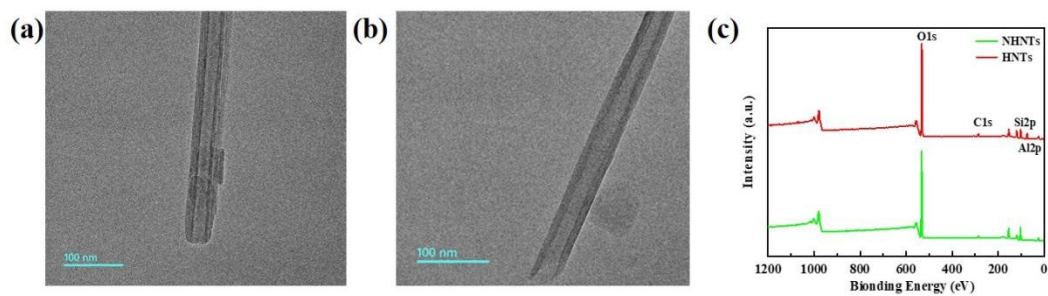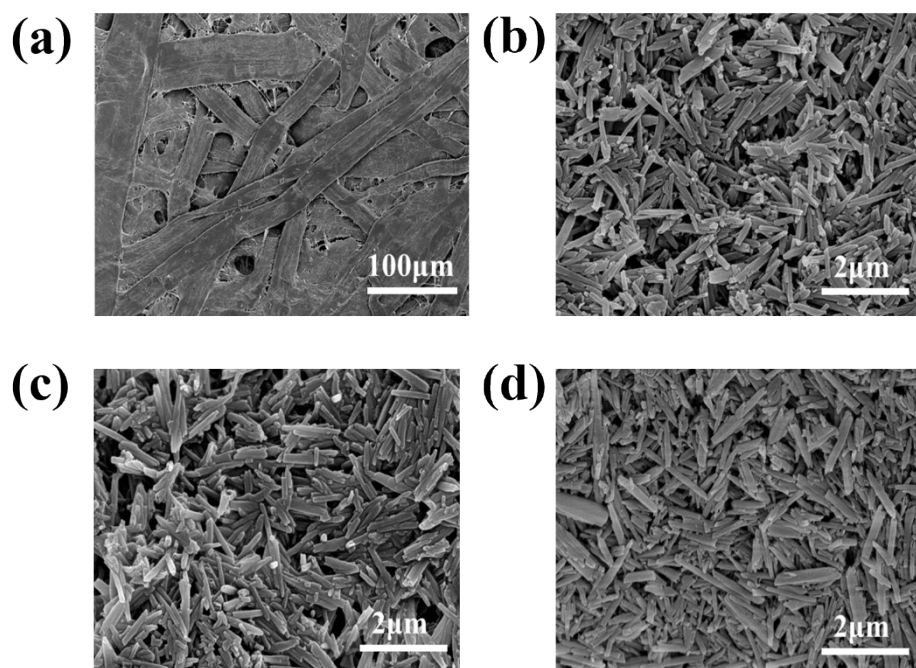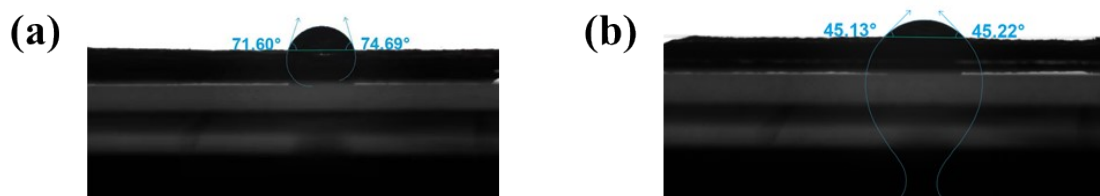**Fig.S2 TGA spectra of HNTs and NHNTs.**

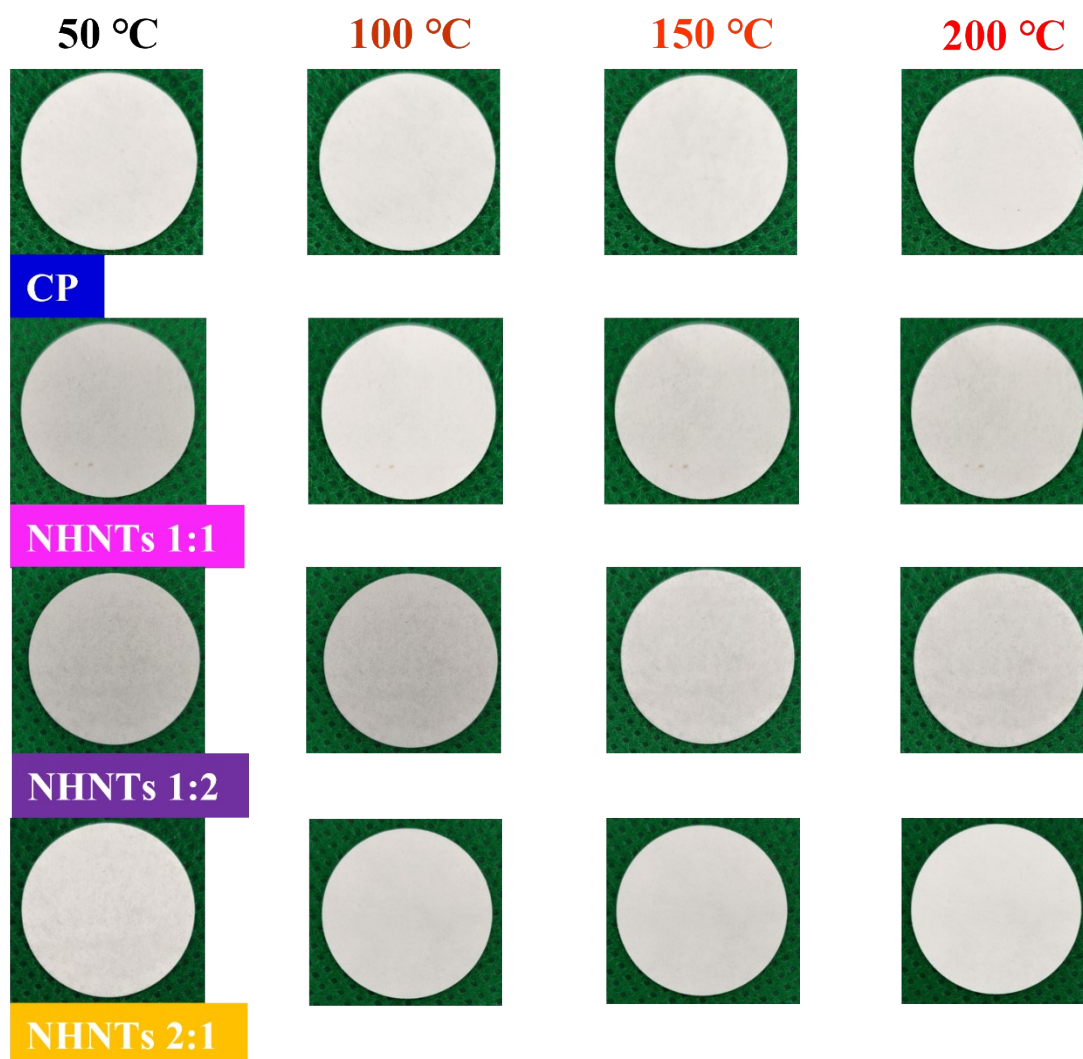**Fig.S3 SEM spectra of (a) HNTs and (b) NHNTs.**

Fig.S4 TEM spectra of (a) HNTs , (b) NHNTs , and
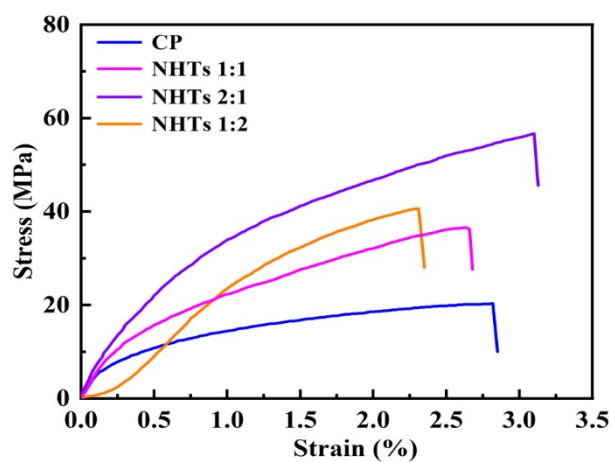
XRS spectra of HNTs and NHNTs (c).

Fig.S5 SEM images of (a) CP, (b) NHNTs1:1, (c) NHNTs1:2, and NHNTs2:1.

Fig.S6 Contact angle of (a) unacidified HNT , and (b) NHNTs 2:1

Fig.S7 Thermal dimensional stability of CP, NHNTs1:1, NHNTs1:2, and NHNTs2:1.

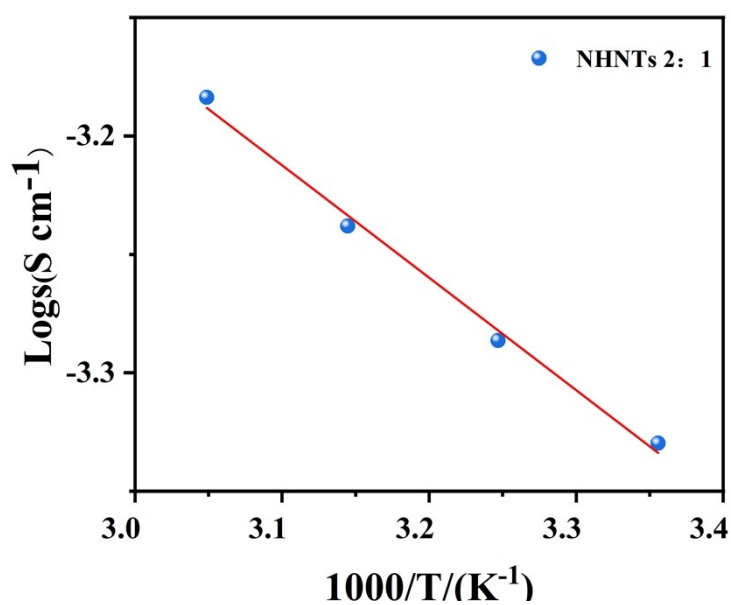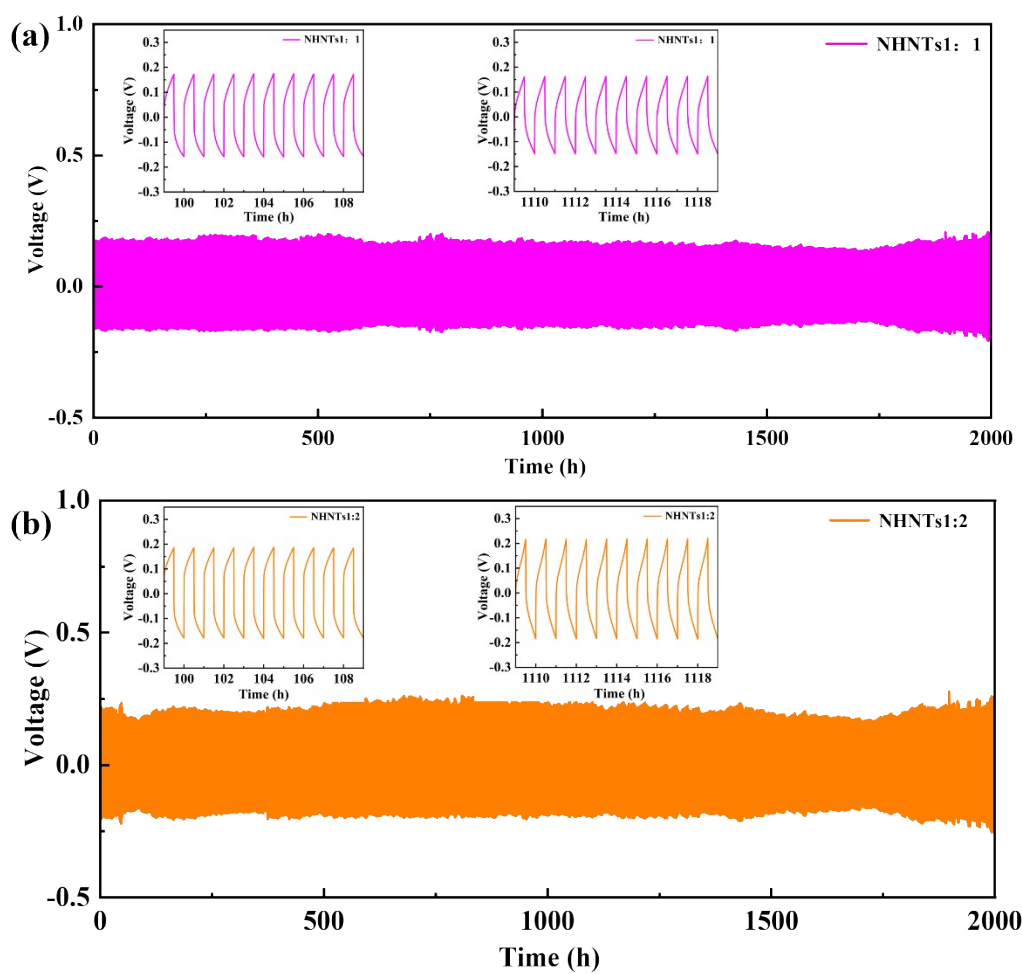**Fig.S8 Stress-strain curves of CP separator, NHNTs1:1 separator, NHNTs1:2 separator, and NHNTs2:1 separator.**
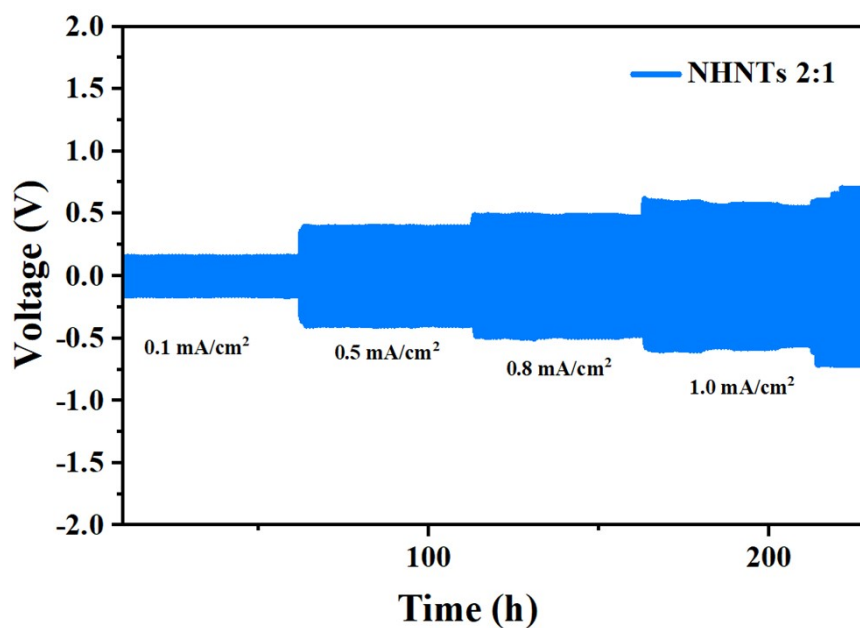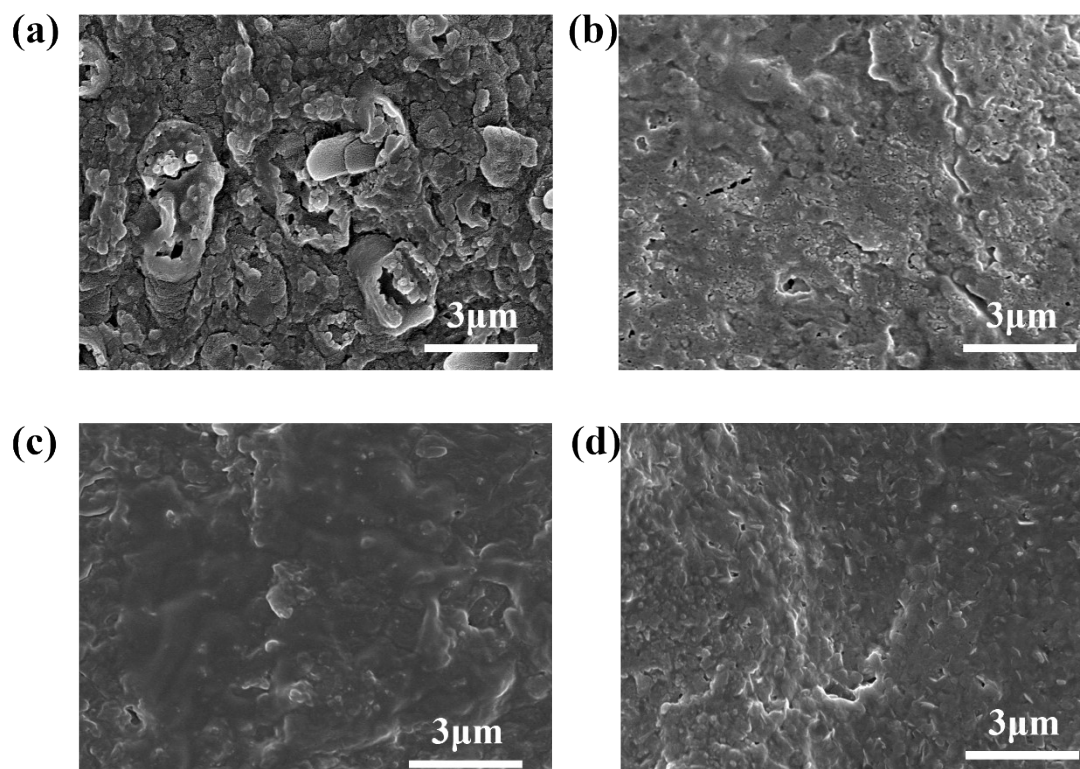
Fig.S9 Arrhenius plots of NHNTs 2:1 separator

Fig.S10 Voltage versus time plots symmetric cell under a current density of 0.1 mA cm⁻² of (a) NHNTs1:1, (b) NHNTs1:2, and (c) Voltage profiles of Li plating/striping cycling with NHNTs 2:1 separator at different currents

Fig.S11 SEM images of Li surface employing (a) CP separator, (b) NHNTs1:1 separator, (c) NHNTs2:1 separator, and (d) NHNTs1:2 separator after 2000 h.
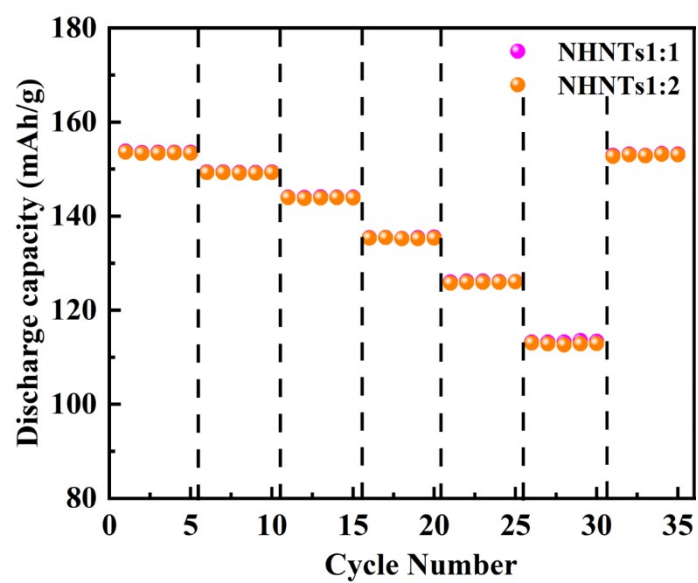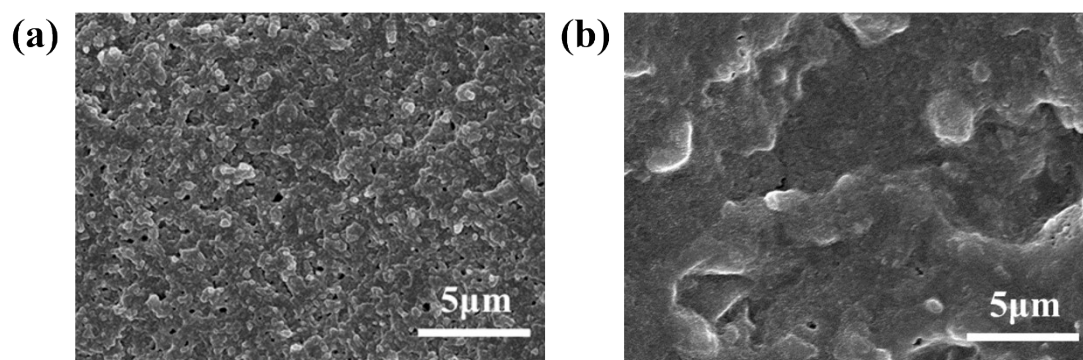
Fig.S12 C-rate capability.

Fig.S13 SEM images of Li surface employing (a) CP separator, (b) NHNTs2:1

separator after 500 cycles.