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Supplementary Information

Fabrication of vulcanized cross-linked polystyrene grafted on carbon nanotubes for use as an advanced lithium host

Xian-lan Ke[1], Yu-heng Lu[1], Jin-lun Wu[2,*], Ding-cai Wu[1,*]

(1. PCFM Lab, School of Chemistry, Sun Yat-sen University, Guangzhou, 510006, China

2. Guangdong Cardiovascular Institute, Guangdong Provincial People's Hospital, Guangdong Academy of Medical Sciences, Guangzhou, 510080, China)

Corresponding author: Jin-lun Wu, E-mail: wujinlun@gdph.org.cn;

Ding-cai Wu, E-mail: wudc@mail.sysu.edu.cn.

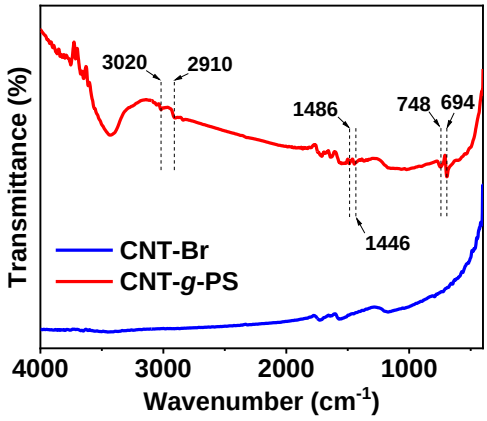

Fig. S1 FTIR spectra of CNT-Br and CNT-*g*-PS.

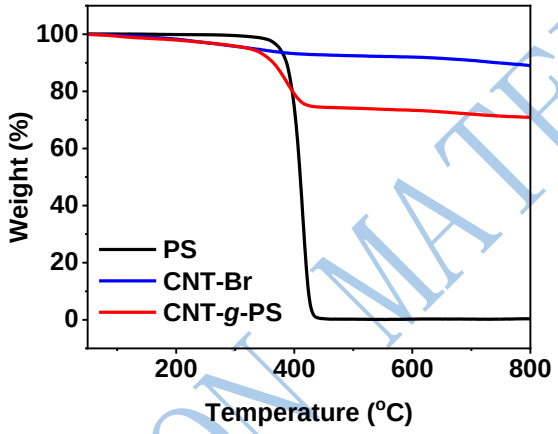

Fig. S2 TGA curves of PS, CNT-Br, and CNT-*g*-PS.

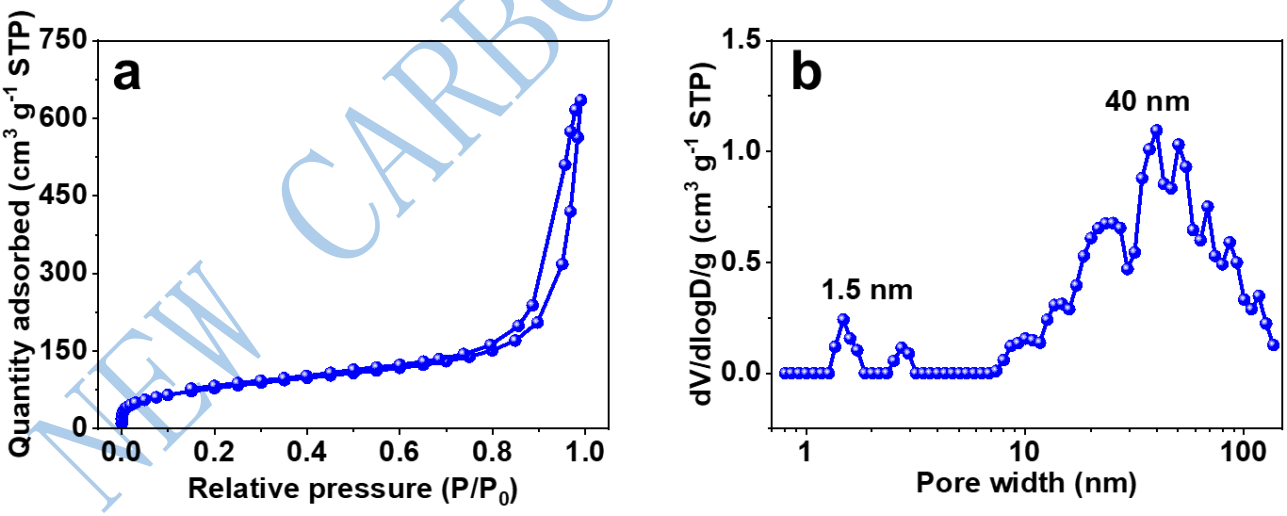

Fig. S3 a) N_2 adsorption-desorption isotherm and b) DFT pore size distribution curves of CNT-*g*-*x*PS.

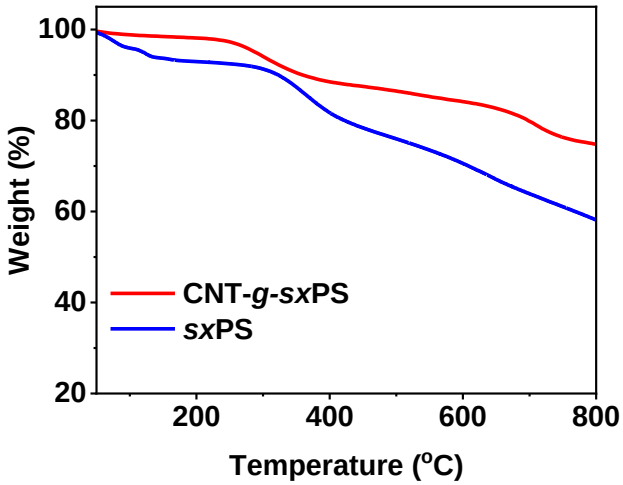

Fig. S4 TGA curves of *sx*PS and CNT-*g*-*sx*PS.

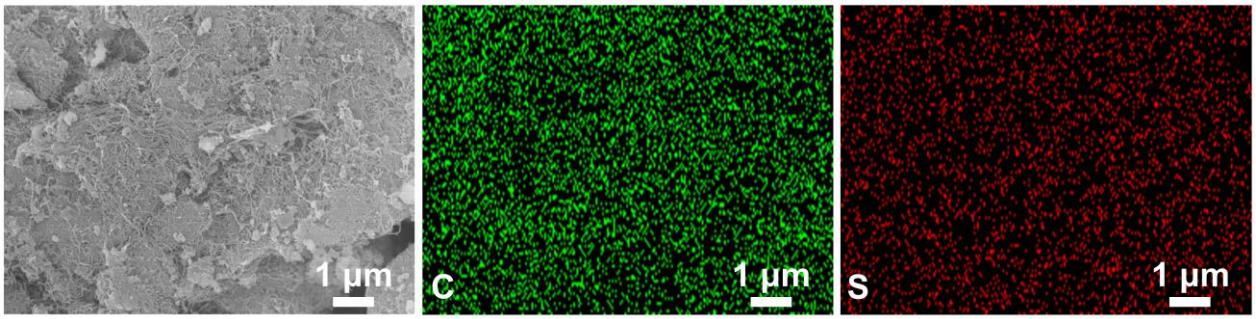

Fig. S5 SEM image and corresponding elemental mapping images of CNT-*g*-*sx*PS.

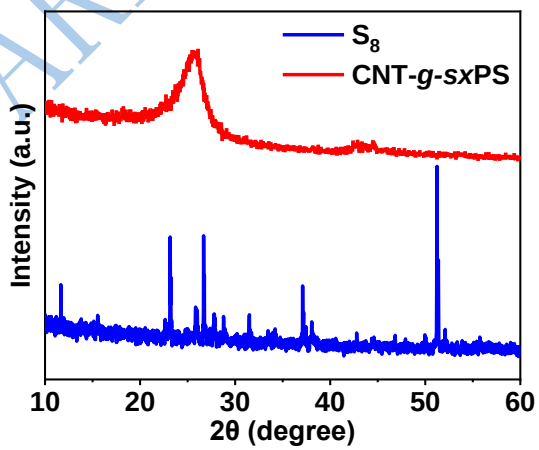

Fig. S6 XRD patterns of S_8 and CNT-*g*-*sx*PS.

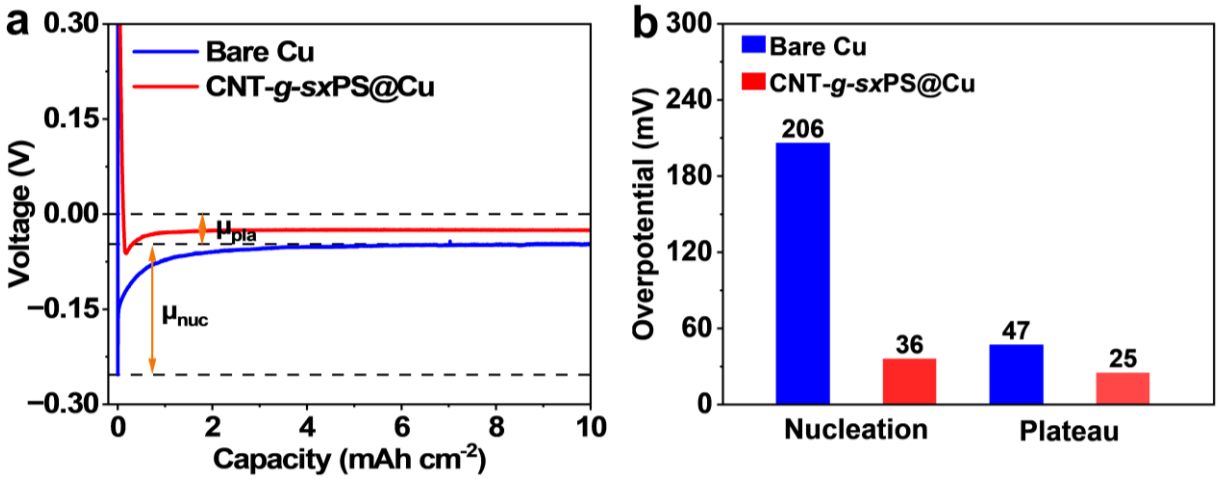

Fig. S7 a) Voltage profiles of galvanostatic Li deposition and b) corresponding overpotentials on bare Cu and CNT-*g*-*sx*PS@Cu at a fixed current density of 1 mA cm^{-2}.

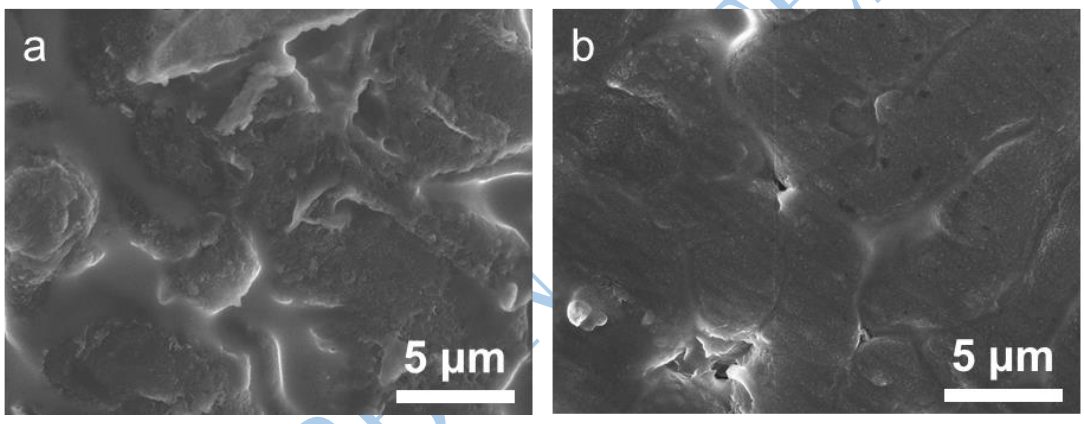

Fig. S8 SEM images of a) bare Cu/Li and b) CNT-*g*-*sx*PS@Cu/Li.

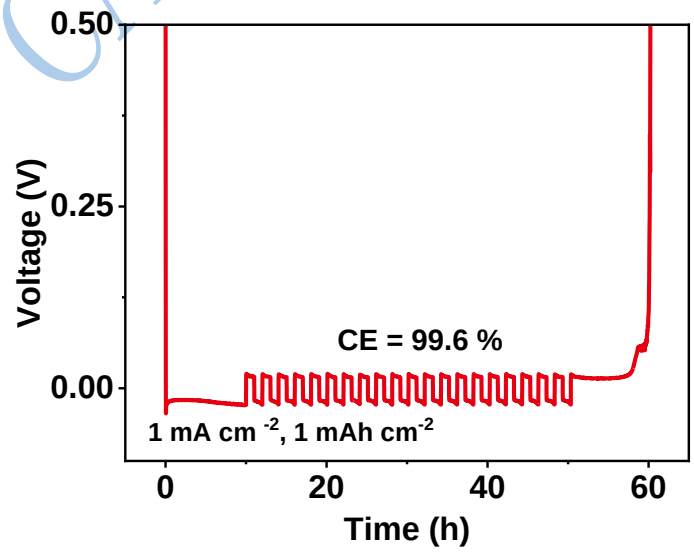

Fig. S9 Coulombic efficiency of the cell with CNT-*g*-*sx*PS@Cu at 1 mA cm^{-2} and 1 mAh cm^{-2}.

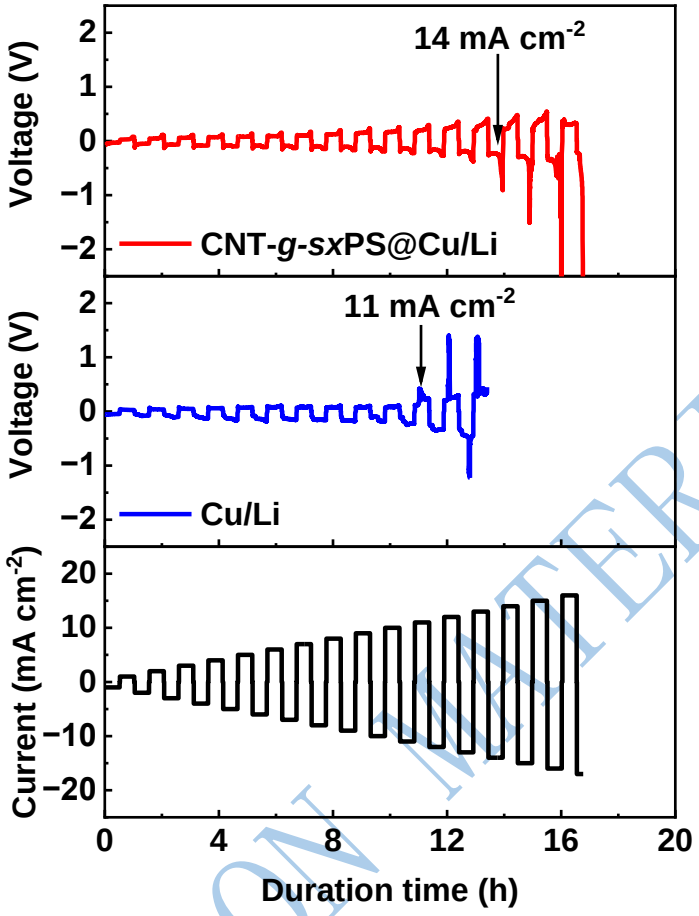

Fig. S10 Voltage-time profiles for critical current density tests of Li|Li symmetric cells with CNT-*g*-*sx*PS@Cu/Li and bare Cu/Li anodes.

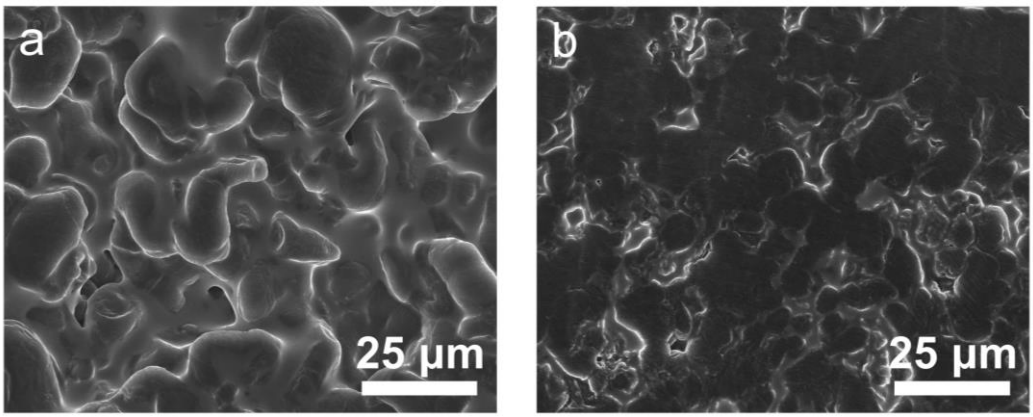

Fig. S11 Top-view SEM images of a) bare Cu/Li and b) CNT-*g*-*sx*PS@Cu/Li anodes after Li|Li symmetric cell tests for 50 cycles at 1 mA cm^{-2} and 1 mAh cm^{-2}.

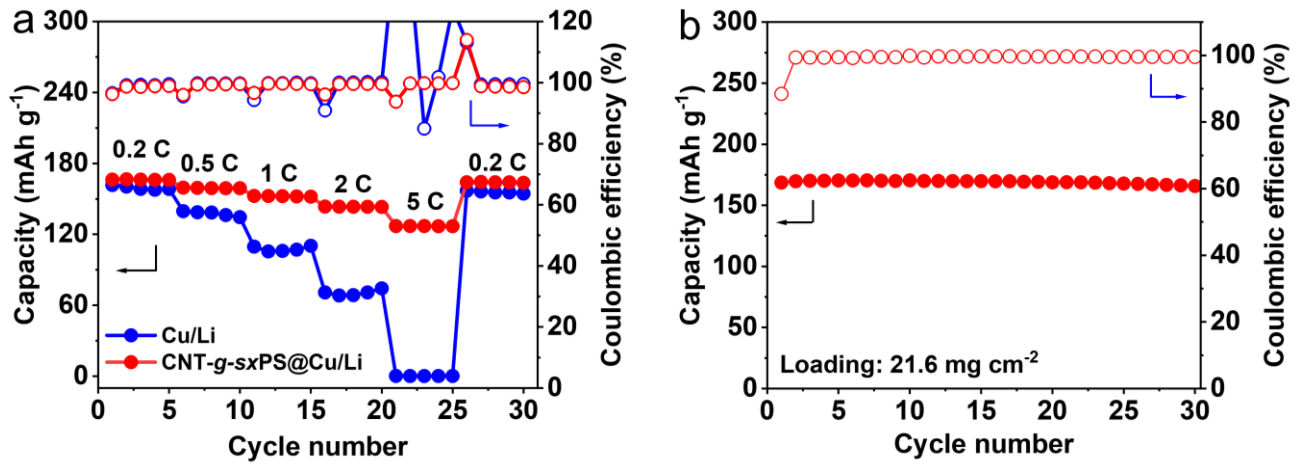

Fig S12 a) Rate performance of the Li|NCM622 cells with bare Cu/Li and CNT-*g*-*sx*PS@Cu anodes. b) Cycling performance of the Li|NCM622 cell with CNT-*g*-*sx*PS@Cu anode at 0.1 C.

Table S1. Performance comparison of symmetric Li|Li cells with CNT-*g*-*sx*PS hosts to reported carbon-based hosts

Sample	Current density (mA cm^{-2})	Areal capacity (mAh cm^{-2})	Duration time (h)	Refs
CNT-*g*-*sx*PS@Cu/Li	1	1	500	This work
VG/CC	1	1	450	[1]
CF/Ag-Li	1	1	400	[2]
MOF-C(30)/Cu	0.4	0.4	500	[3]
Li@PCSF	2	1	100	[4]
Fe50	1	0.5	420	[5]
Li@CC	1	1	400	[6]
Li@HPTCF	1	1	300	[7]

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