Supporting Information

Green preparation of porous electrodes containing Si via sublimation and regeneration of nanostructured terephthalic acid for enhanced Li-ion storage

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Fig. S1. TEM analysis of Nano-TPA: (a) Bright field TEM micrograph, and (b) Electron diffraction pattern recorded on the image, exhibiting rings and spots corresponding to the crystalline planes of SnO₂. (c) High magnification TEM micrograph recorded on a SnO₂ nanocrystal, and (d) the FFT pattern recorded on the nanocrystal. (e) The EDS mapping analysis showing the elemental distribution of C, O and Sn. (f) N₂ adsorption-desorption isotherms, and (g) pore size distribution of Si@PI@350. (h) N₂ adsorption-desorption isotherms, and (i) pore size distribution of Si@PI@nano-TPA@350. (j) N₂ adsorption-desorption desorption isotherms of Si@PI@micro-TPA@350, and (k) its pore size distribution.



Fig. S2. (a) The XRD spectra of raw materials including Nano-TPA, SiNPs, PI and the standard pattern of Si and TPA; (b) The XRD spectra of SiNPs ball milled with nano-TPA.

Fig. S3. TGA and DSC thermograms of PI@nano-TPA.



Fig. S4. The TG-DSC thermograms of the (a) PI@nano-TPA@350 powder and (b) PI powder.



Fig. S5. FTIR spectra of the TPA, PI, PI@nano-TPA, PI@nano-TPA@250 and PI@nano-TPA@350 powders.



Fig. S6. TEM of the Si nanoparticles with oxide layer.



Fig. S7. Li⁺ storage cycle performances of Si@tPI-350 electrode with different ratio (Si: PI: TPA: Super P = 5:2:2:1/6:1:1:2/4:2:2:2/6:2:0:2) and Si@CMC at 200 mA g⁻¹.



Fig. S8. Li⁺ storage cycling performances of Si@PI@nano-TPA@E-350 electrode at (a) 5000 mA/g and (b) 10000 mA/g¹.



Fig. S9. The simulated circuit used to calculate the impedance of electrodes in Fig. 6a.



Fig. 10. Cycling performance and corresponding Coulombic efficiency of the LFP//Si@PI@nano-TPA@E-350 coin full cell at 200 mA/g, based on the Si mass.



Fig. S11. The second cycle GCD profiles of the half cells (LFP cathode and the Si@PI@nano-TPA@E-350 anode) and the full cell (LFP//Si@PI@nano-TPA@E-350) at 200 mA/g.

Sample	BET surface area	Average pore	Pore volume (cm^{3}/g)
	(m ² /g)	diameter (nm)	
Si@PI@350	35.8	25.1	0.14
Si@PI@nano-	27.4	15.5	0.17
TPA@350			
Si@PI@micro-	37.6	11.1	0.10
TPA@350			

Table S1. The surface properties of samples based on N2 adsorption/desorption experiments