Electronic supplementary information

Rutile-type $(Ti,Sn)O_2$ nanorods as efficient anode materials toward its lithium storage capabilities

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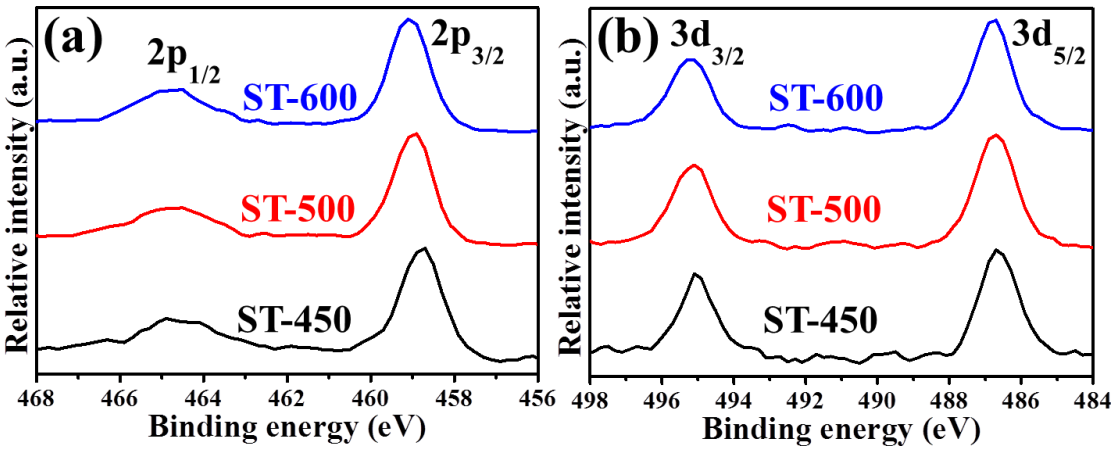

Fig. S1 (a) Ti 2p and (b) Sn 3d XPS core level spectra of (Ti,Sn)O_2 solid solutions obtained at various calcination temperatures.

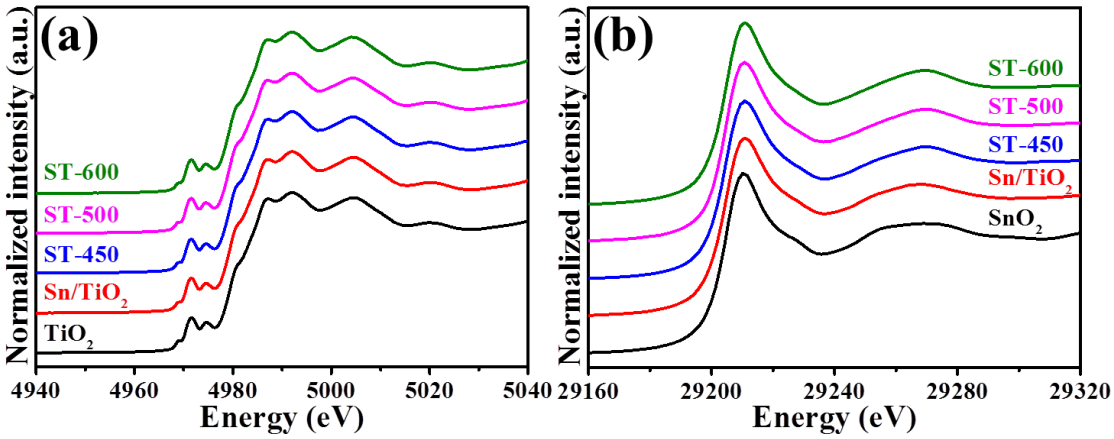

Fig. S2 (a) Ti and (b) Sn *K*-edge XANES spectra of (Ti,Sn)O_2 solid solutions obtained at various calcination temperatures.

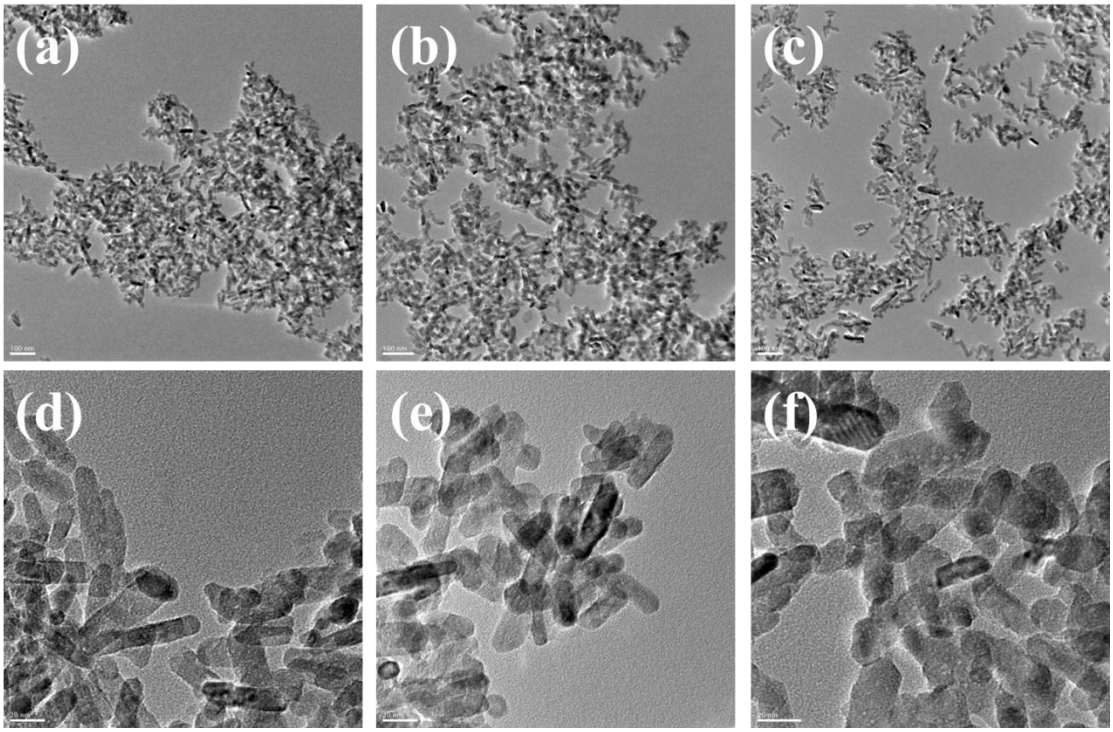

Fig. S3 TEM images of (a、d) ST-450, (b、e) ST-500 and (c、f) ST-600. The scale bar in the upper image is 100 nm and in the lower is 20 nm.

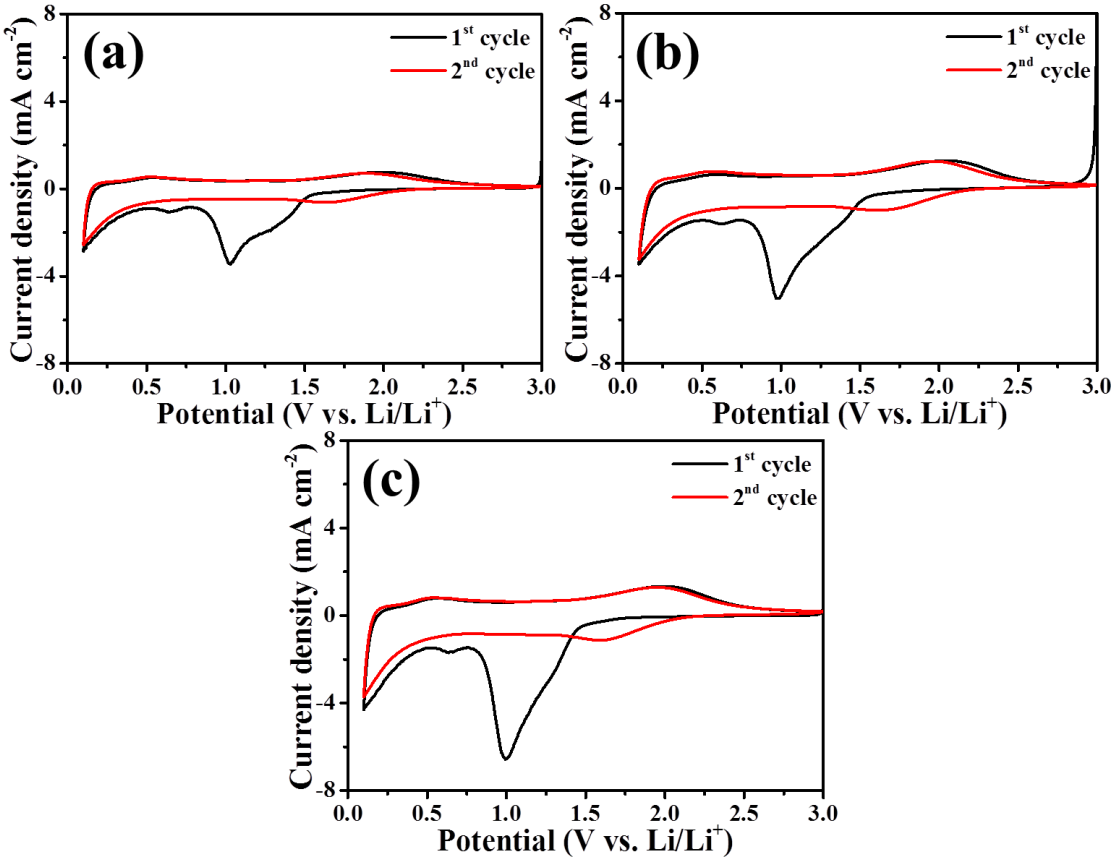

Fig. S4 Cyclic voltammograms of (a) ST-450, (b) ST-500 and (c) ST-600 recorded by a scan rate of 1.0 mV s^{-1} between 0.1 V and 3.0 V in 1 M $LiPF_6$ EC/DEC (1:1 w/w) solution.

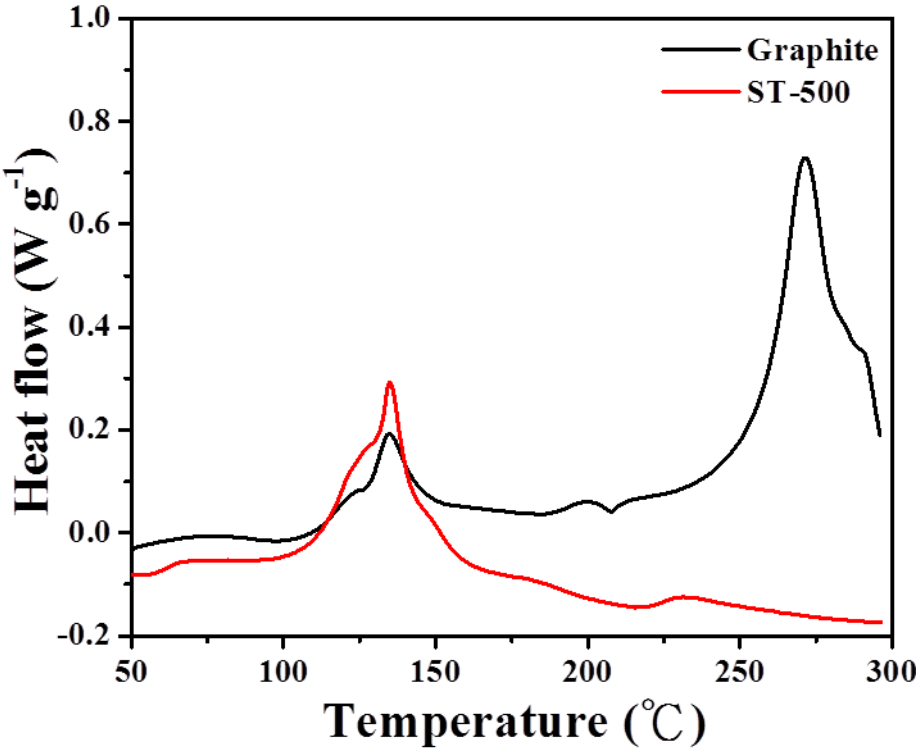

Fig. S5 DSC thermograms of lithiated electrodes obtained in N_2 atmosphere with the heating rate of 10 ℃ min^{-1}.

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Table S1 Lattice constants of a unit cell for Sn/TiO_2 and $(Ti,Sn)O_2$ solid solutions refined by GSAS with Rietveld method

Sample	*a* / Å	*b* / Å	*c* / Å	Volume / $Å^3$
Sn/TiO_2	4.6199	4.6199	2.9577	63.127
ST-450	4.6129	4.6129	2.9753	63.311
ST-500	4.6126	4.6126	2.9758	63.315
ST-600	4.6124	4.6124	2.9774	63.342

Table S2 Atomic ratio in various regions of each (Ti,Sn)O_2 solid solution estimated by energy-dispersive X-ray (EDX) spectroscopy analysis

		ST-450	ST-500	ST-600
		Atomic %	Atomic %	Atomic %
I	Ti	93.0	89.0	90.0
	Sn	7.0	11.0	10.0
II	Ti	84.8	89.2	89.5
	Sn	15.2	10.8	10.5

Table S3 Atomic ratio of each (Ti,Sn)O_2 solid solution determined by ICP-AES analysis

Sample	Ti ppm	Sn ppm	Ti Atomic %	Sn Atomic %	Chemical formula
ST-450	40.49	16.92	86	14	$(Ti_{0.86}Sn_{0.14})O_2$
ST-500	46.6	19.37	86	14	$(Ti_{0.86}Sn_{0.14})O_2$
ST-600	40.98	16.68	86	14	$(Ti_{0.86}Sn_{0.14})O_2$