Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Electronic Supplementary information

Facile synthesis of SnO_2@carbon nanocomposite for lithium ion battery

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S1: The rate performance at different current densities and Cycling performances

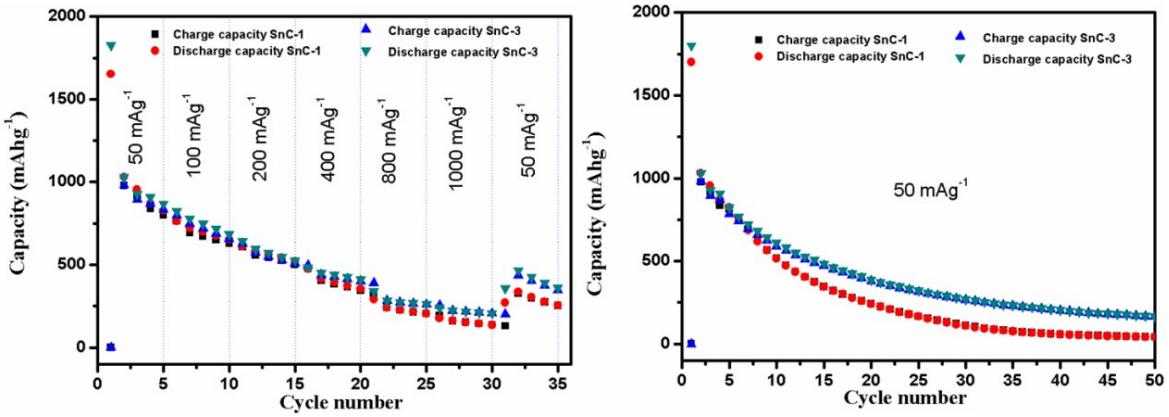

Figure. S1 The rate performance, at different current densities and Cycling performances of SnC-1, and SnC-3 between 0.01 and 3V for lithium ion batteries for 50 cycles.

The 50th discharge capacities of pristine SnC-0, SnC-1, SnC-2 and SnC-3 were 41, 135, 808 and 164 mAhg-1. This study, demonstrates SnC-2 shows better stability compared to other samples. Therefore further rate performance and cyclability study (200 cycles) carried out for pristine and SnC-2 sample.

S2: Columbic efficiency of SnC-0 and SnC-2 sample

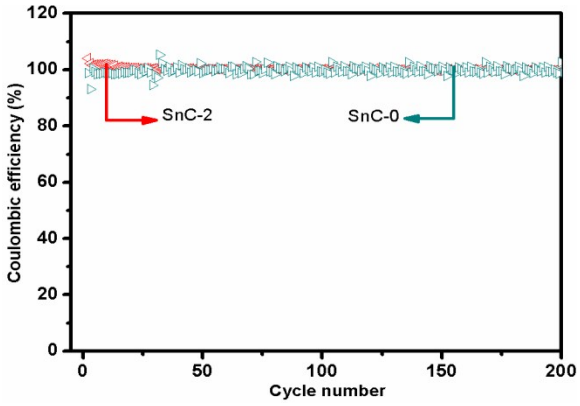

Figure. S2 The columbic efficiency of the SnO2 and SnO2@C nanocomposites (SnC-2) electrodes for lithium ion batteries.

S3: Tap density of nanocomposites powder

As procedure given in report tapped density of a powder is the ratio of the mass of the powder to the volume occupied by the powder after it has been tapped for a defined period of time. [1, 2, 3]The tapped density of a powder represents its random dense packing. It is measured using eq.

Tapped Density (g/mL) = M*Vf

Where, M = mass in grams, Vf = tapped volume in milliliters.[4] The tap density of SnC-0, SnC-1, SnC-2 and SnC-3 are 1.225, 0.981, 0.668, and 0.386 g/mL.

S4: Press density of Anode

Press density of the electrode film is also measured via gravimetric method using following eq.

$$d = m / (A*\rho)$$

Where, d = film thickness, m = mass, ρ = density, and A = area covered. The density of SnC-0 SnC-1, SnC-2 and SnC-3 electrodes before roll press are 0.724, 0.25, 0.692 and 0.3944 g/cc which is increased 0.94, 0.36, 1.2454 and 0.743 g/cc after roll press respectively. Density of the electrode increases with the concentration of the citric acid. [5, 6, 7]

Table S1. Comparison of the SnO2/C composites for their electrochemical performance

No	Current density	Capacity $mAhg^{-1}$ (at initial Cycle)	Rate performance capacity (mAhg-1) @ current density (cycle)	Reference
1.	250mAg−1	1946	1050@250 mAg−1 (130)	Co_3Sn_2/SnO_2 on Cu foam[8]
2.	100mAg−1	1020	474@1000mAg−1(50)	$CuxO/SnO_2/ZnSnO_3$[9]
3.	100mAg−1	684	494@100mAg−1(200)	SnO_2@carbon for Na ion battery[10]
4.	0.1A/g	2010	500@0.1 Ag−1(40)	SnO_2 nanotube[11]
5.	0.2C	1267	674@0.2C (35)	Ni-doped SnO_2[12]
6.	50mAg−1	2805	537@50mAg−1(50)	graphene–TiO_2–SnO_2[13]
7.	0.1C	1580	404@0.1C(50)	TiN surface modified SnO_2 [14]
8.	500mAg−1	1700	500@500 mAg−1 (20)	Carbon-Coated SnO2[15]
9.	100mAg−1	964	420@100 mAg−1 (100)	SnO2@carbon composite nanofibers[16]
10.	C/20	460	500@1C(20)	SnO2 / Mesoporous Carbon[17]
8.	**50 mAg-1**	**1850**	**119@50 mAg−1 (200)**	**Present work (SnO_2)**
9.	**50 mAg-1**	**2581**	**725@50 mAg−1 (200)**	**present work (SnO_2@C)**

Notes and references

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