Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Layered SnS_2 Cross-linked by Carbon Nanotubes as High Performance Anode for Sodium Ion Batteries

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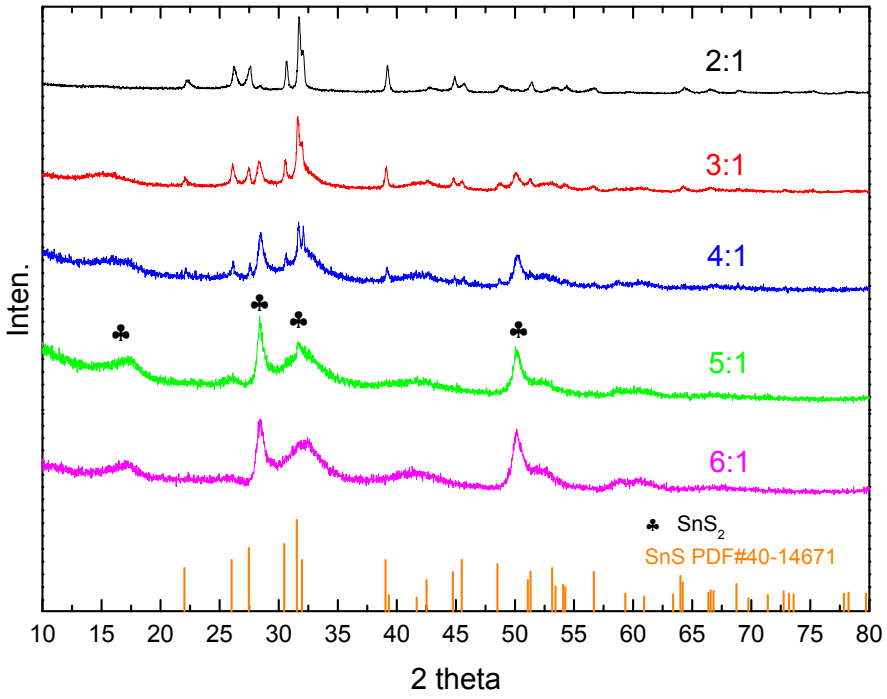

Figure S1, XRD patterns of as-prepared products with different ratios between sulfur and DBTA: 2:1, 3:1, 4:1, 5:1, 6:1 and JCPDS Card no. 40-14671.

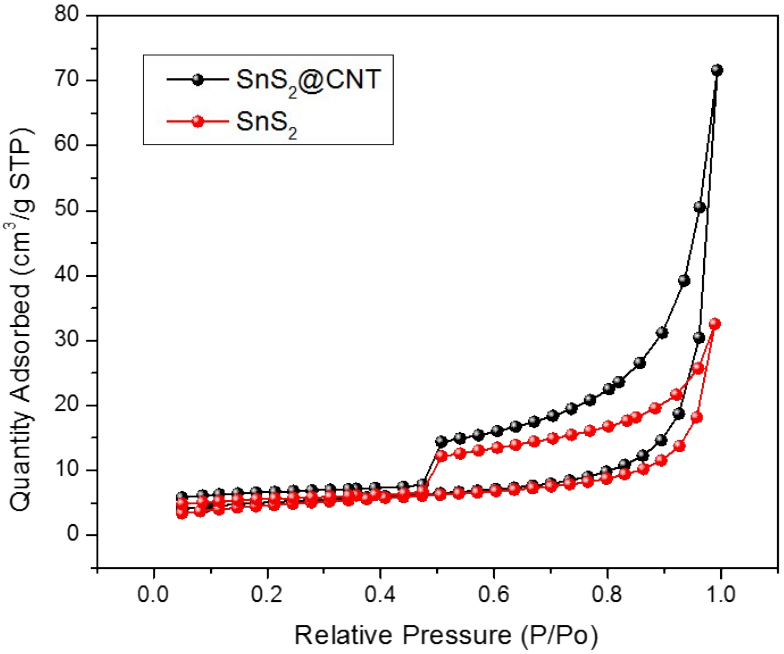

Figure S2, Nitrogen adsorption and desorption isotherms. Based on the results, the Brunauer-Emmett-Teller (BET) surface of SnS_2@CNT and SnS_2 was calculated to be 17.03 and 4.45 $m^2\ g^{-1}$, respectively.

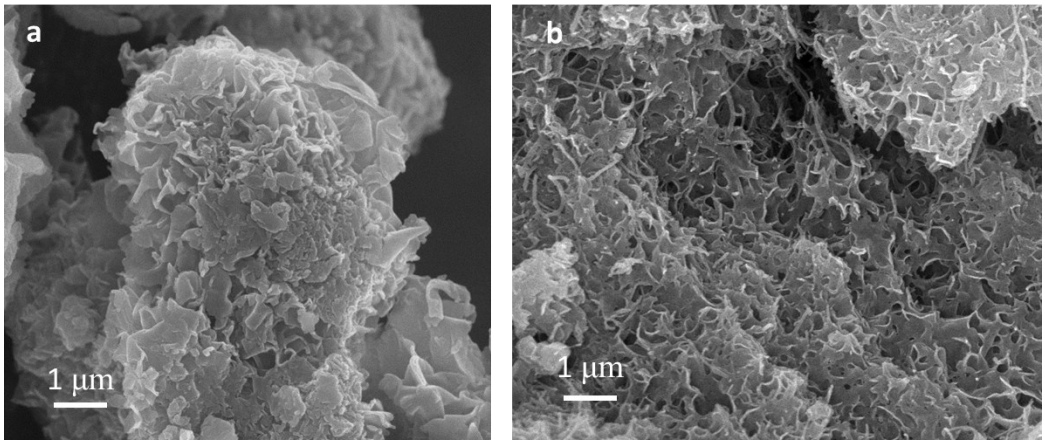

Figure S3 Comparison of SEM images between bare SnS_2 and SnS_2@CNT nanocomposites.

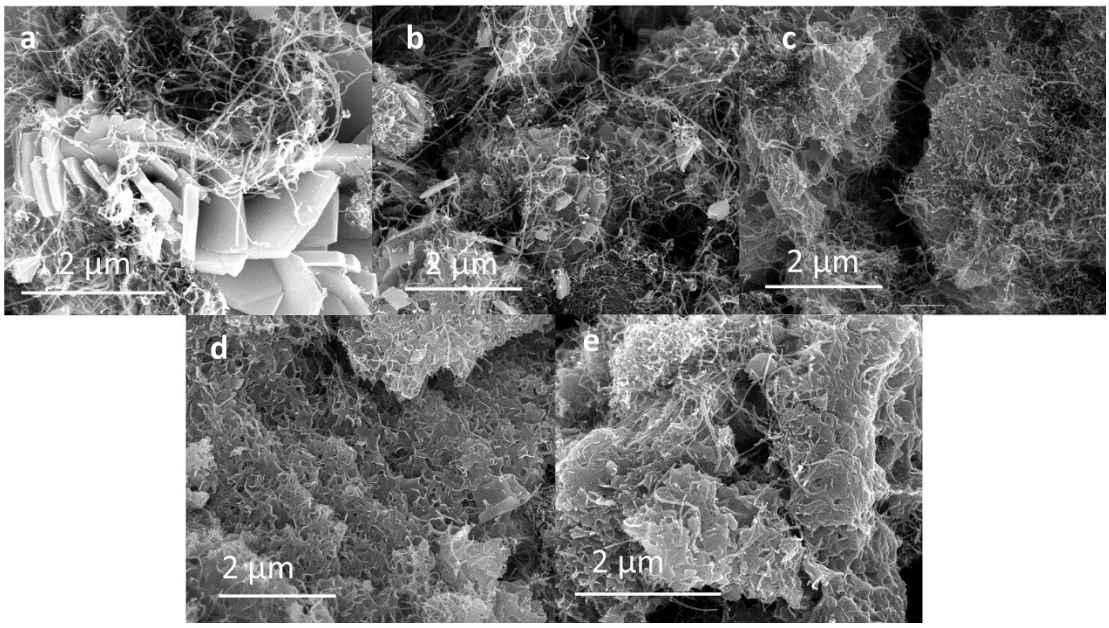

Figure S4, SEM images of all as-prepared SnS_2@CNT products with different ratios of S and DBTA (S/DBTA a 2:1, b 3:1, c 4:1, d 5:1 and e 6:1.)

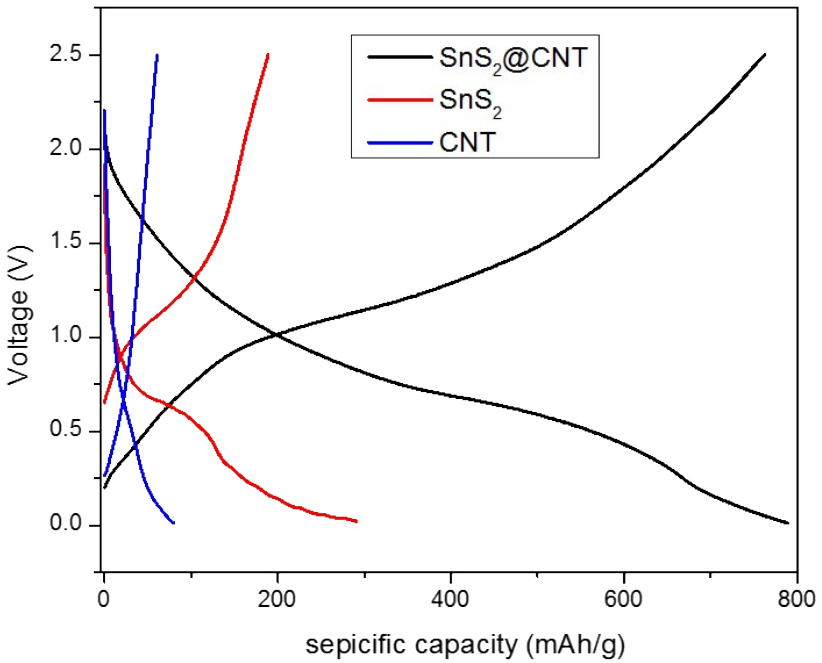

Figure S5, The charge-discharge profiles of SnS_2, SnS_2@CNT and CNT electrode of the second cycle Current density: 100 mA cm^{-2}

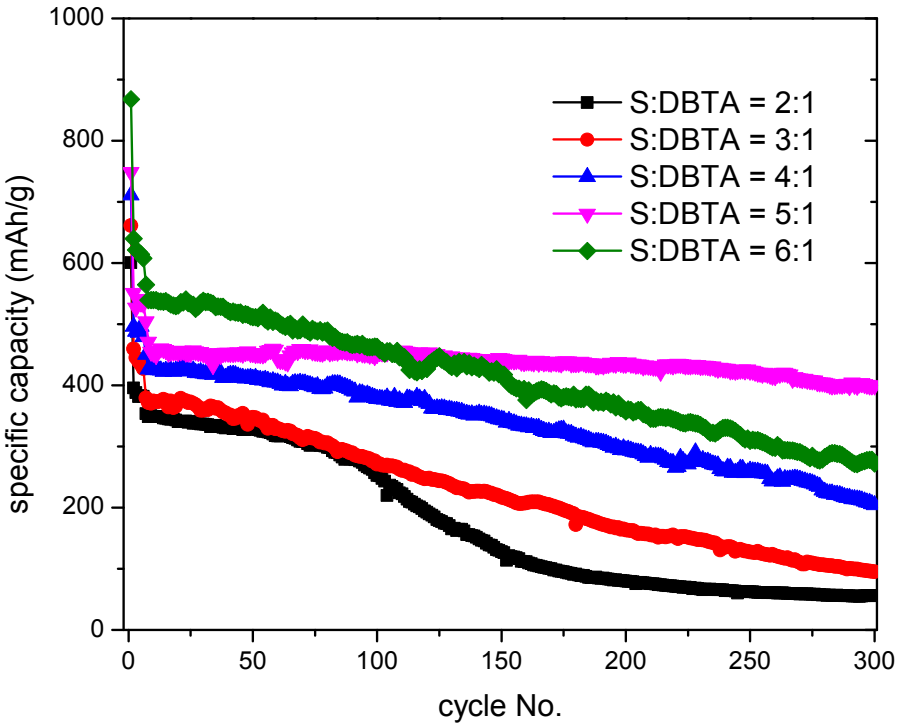

Figure S6, Cycling performances of the as-synthesized samples (various ratios of S and DBTA) at 400 mA g^{-1} at 1 A g^{-1}.

The electrochemical performances of the as-prepared SnS_2@CNT composites with different sulfur content (S : DBTA = 2:1, 3:1, 4:1, 5:1 and 6:1) were investigated. The reversible capacities increased with the increasing of sulfur content due to the transformation of the products from SnS to SnS_2. However, the variation tendency of cycling performance exists a transition at the point of 5:1 where exhibits an optimal cycling performance.

Table S1 comparison of the results in this study with those of previously reported in the literature.

Anode	Capacity / Current density	Cycle number / capacity retention	Reference
SnS_2 / rGO	610 mA h g^{-1} / 50 mA g^{-1} 320 mA h g^{-1} / 2 A g^{-1}	150 / -	[1]
SnS_2 / graphene	650 mA h g^{-1} / 200 mA g^{-1} 326 mA h g^{-1} / 4A g^{-1}	300 / 93.8%	[2]
SnS_2 / C	660 mA h g^{-1} / 50 mA g^{-1} 360 mA h g^{-1} / 1A g^{-1}	100 / 86.4%	[3]
SnS_2 / rGO	649 mA h g^{-1} / 100 mA g^{-1} 337 mA h g^{-1} / 12.8A g^{-1}	400 / 89%	[4]
SnS_2-RGO	630 mA h g^{-1} / 200 mA g^{-1} 544 mA h g^{-1} / 2A g^{-1}	400 / 84%	[5]

SnS / rGO	1037 mA h g^{-1} / 30 mA g^{-1} 308(250th) mA h g^{-1} / 7.29A g^{-1}	50 / 91%	[6]
Sn_3P_4	718 mA h g^{-1} / 100 mA g^{-1}	100 / 90%	[7]
SnO_2 / rGO	406 mA h g^{-1} / 100 mA g^{-1} 125 mA h g^{-1} / 1A g^{-1}	150 / 81%	[8]
CNT / SnO_2 / C	420mA h g^{-1} / 50 mA g^{-1} 176 mA h g^{-1} / 1A g^{-1}	60 / 76%	[9]
SnO	570 mA h g^{-1} / 50 mA g^{-1} 150 mA h g^{-1} / 1A g^{-1}	50 / 44%	[10]

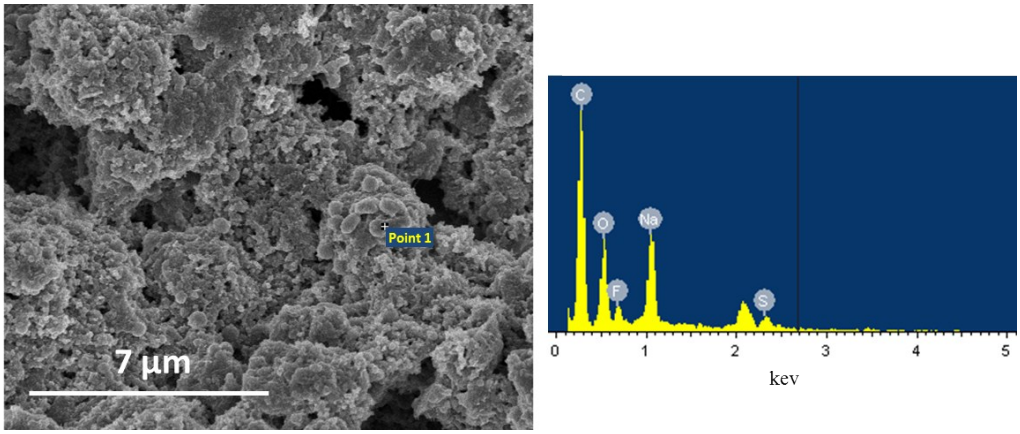

Figure S7, EDS result of SnS_2@CNT electrode after 50 cycles and corresponding SEM image.

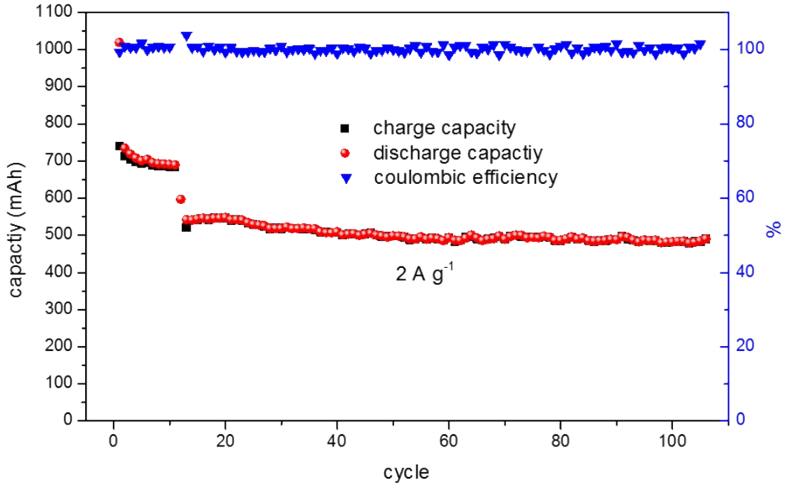

Figure S8. Cycling performance of the SnS_2@CNT electrode, first ten cycles at 100 mA g^{-1} and 2 A g^{-1} for the next 100 cycles.

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