Electronic Supplementary Information

Polycrystalline Zinc Stannate as Anode Material for Sodium-ion Batteries

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Additional Figures

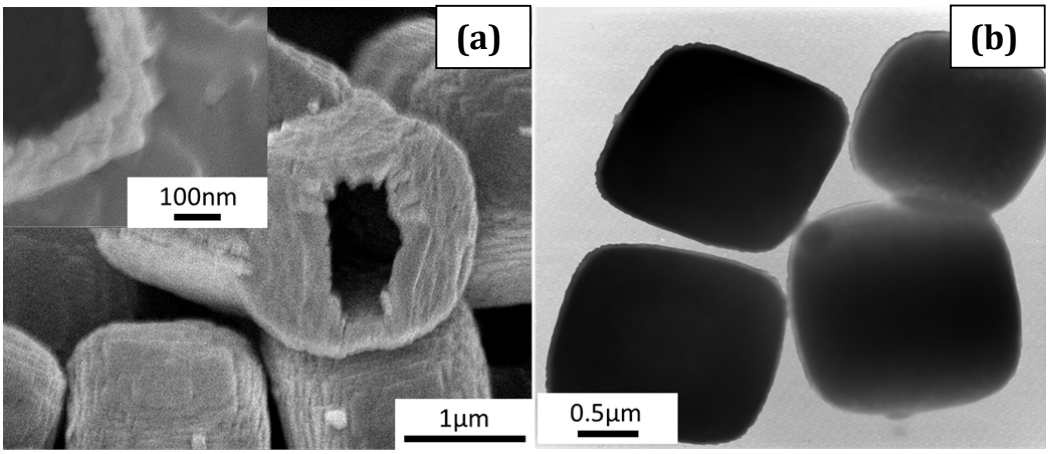

Figure S1. (a) High-mag FESEM images of ZSO-H revealing the hollow interior and (inset) a closer look at the agglomerates forming the wall. (b) TEM image of ZSO

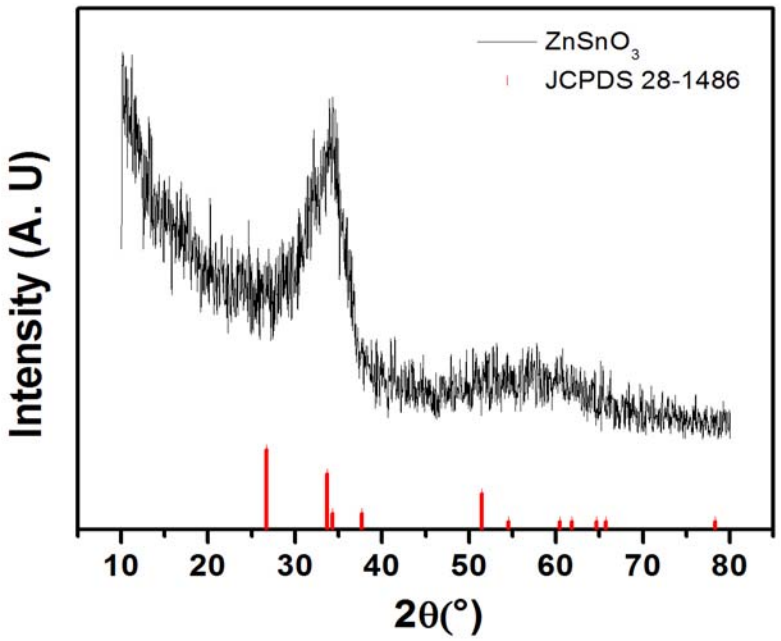

Figure S2. XRD pattern of the as prepared $ZnSnO_3$

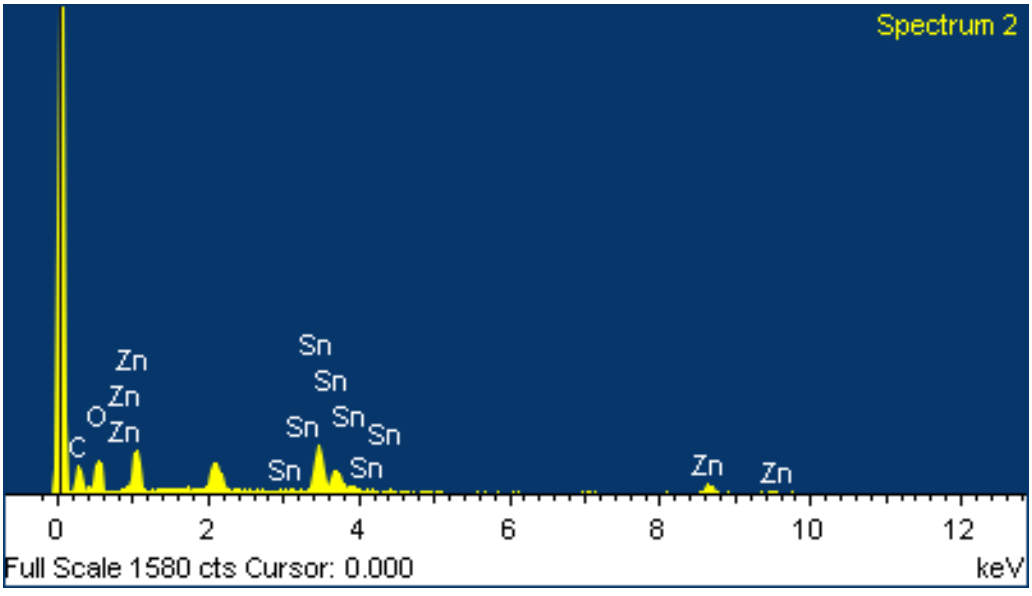

Figure S3. EDX Mapping of polycrystalline $ZnSnO_3$ hollow cubes

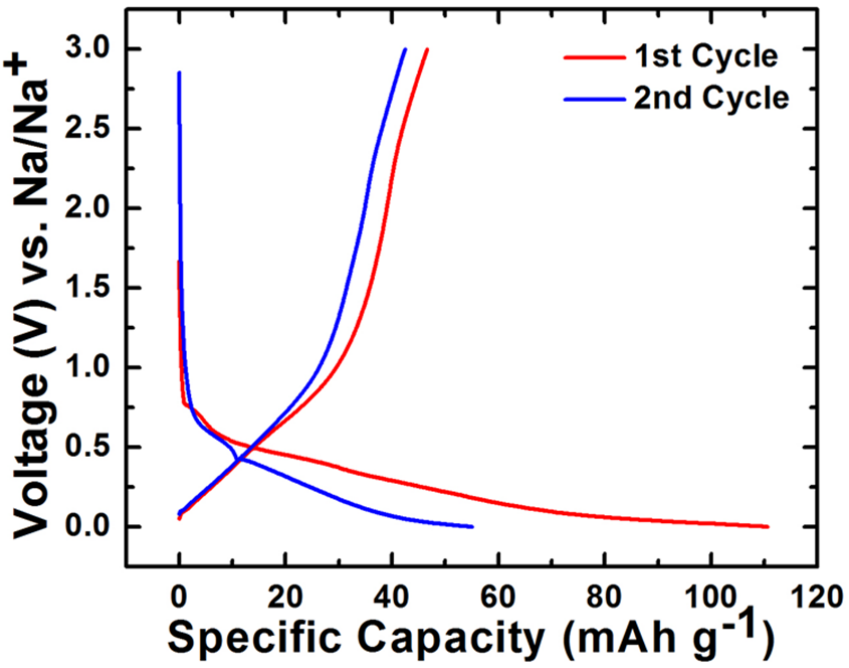

Figure S4. 1st and 2nd charge-discharge profiles of commercially available ZnO at 30mA g^{-1}

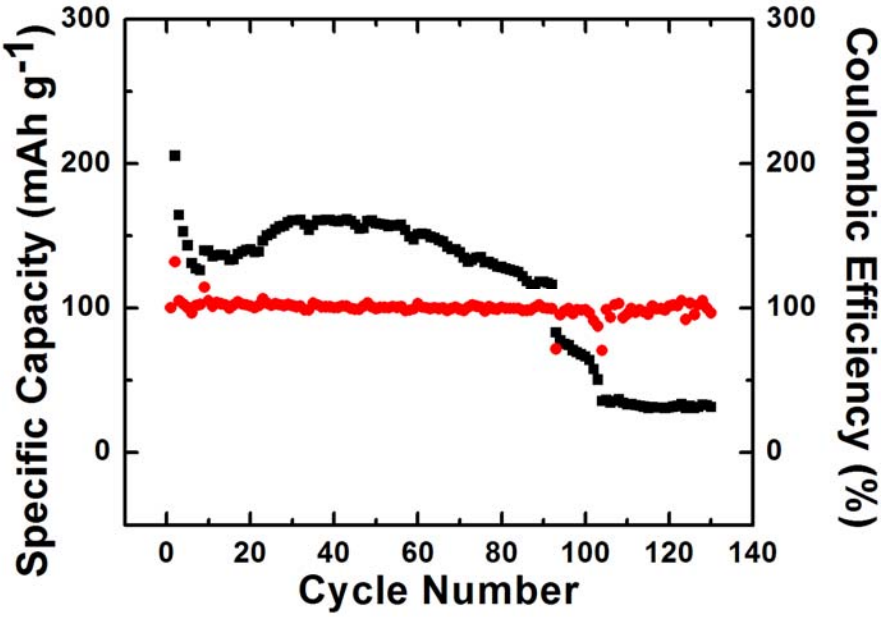

Figure S5. Cycling performance of $ZnSnO_3$ without addition of FEC

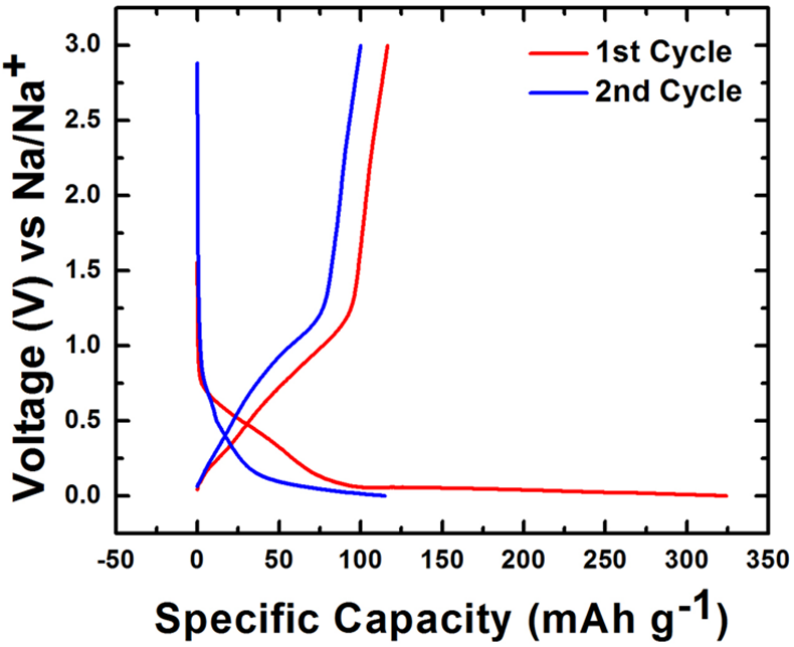

Figure S6. 1st and 2nd charge-discharge profiles of manually blended ZnO-SnO_2 compound at 30mA g^{-1}

Method of preparation	Discharge voltage range (V) vs. Na^+ /Na	% Capacity retention at end of cycling	ref
hydrothermal	0-0,80	0% at 100 mA g^{-1} after 100 cycles	1
hydrothermal	0-0,80	0% at 80 mA g^{-1} after 50 cycles	2
solvothermal	0-0,75	16,8% at 0,1C after 50 cycles	3
hydrothermal	-	~82% at 20 mA g^{-1} after 100 cycles	4
ball milling	-	0% at 100 mA g^{-1} after 100 cycles	5
hydrothermal	0-0,50	~20% at 20 mA g^{-1} after 100 cycles	6
hydrothermal	0-0,8	0% at 50 mA g^{-1} after 50 cycles	7
commercial SnO2	0-~0,1	~100% at 100 mA g^{-1} after 10 cycles	8
hydrothermal	0-0,5	60,8% at 160 mA g^{-1} after 100 cycles	9
Co-precipitation $ZnSnO_3$	0-0.3	92% after 100 cycles at 250 mA g^{-1}	Current work

Table S1. Comparison of electrochemical performance of hollow $ZnSnO_3$ with bare SnO_2 in literature

1. Y. Zhang, J. Xie, S. Zhang, P. Zhu, G. Cao and X. Zhao, *Electrochimica Acta*, 2015, 151, 8-15.
2. J. Ding, Z. Li, H. Wang, K. Cui, A. Kohandehghan, X. Tan, D. Karpuzov and D. Mitlin, *Journal of Materials Chemistry A*, 2015, 3, 7100-7111.
3. Y. Wang, D. Su, C. Wang and G. Wang, *Electrochemistry Communications*, 2013, 29, 8-11.
4. D. Su, H.-J. Ahn and G. Wang, *Chemical Communications*, 2013, 49, 3131-3133.
5. S. Li, Y. Wang, J. Qiu, M. Ling, H. Wang, W. Martens and S. Zhang, *RSC Advances*, 2014, 4, 50148-50152.
6. X. Xie, D. Su, J. Zhang, S. Chen, A. K. Mondal and G. Wang, *Nanoscale*, 2015, 7, 3164-3172.
7. Y. C. Lu, C. Ma, J. Alvarado, T. Kidera, N. Dimov, Y. S. Meng and S. Okada, *Journal of Power Sources*, 2015, 284, 287-295.
8. J. Park, J.-W. Park, J.-H. Han, S.-W. Lee, K.-Y. Lee, H.-S. Ryu, K.-W. Kim, G. Wang, J.-H. Ahn and H.-J. Ahn, *Materials Research Bulletin*, 2014, 58, 186-189.
9. D. Su, C. Wang, H. Ahn and G. Wang, *Physical Chemistry Chemical Physics*, 2013, 15, 12543-12550.