Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Formation of core–shell-structured Zn_2SnO_4–carbon microspheres with superior electrochemical properties by one-pot spray pyrolysis

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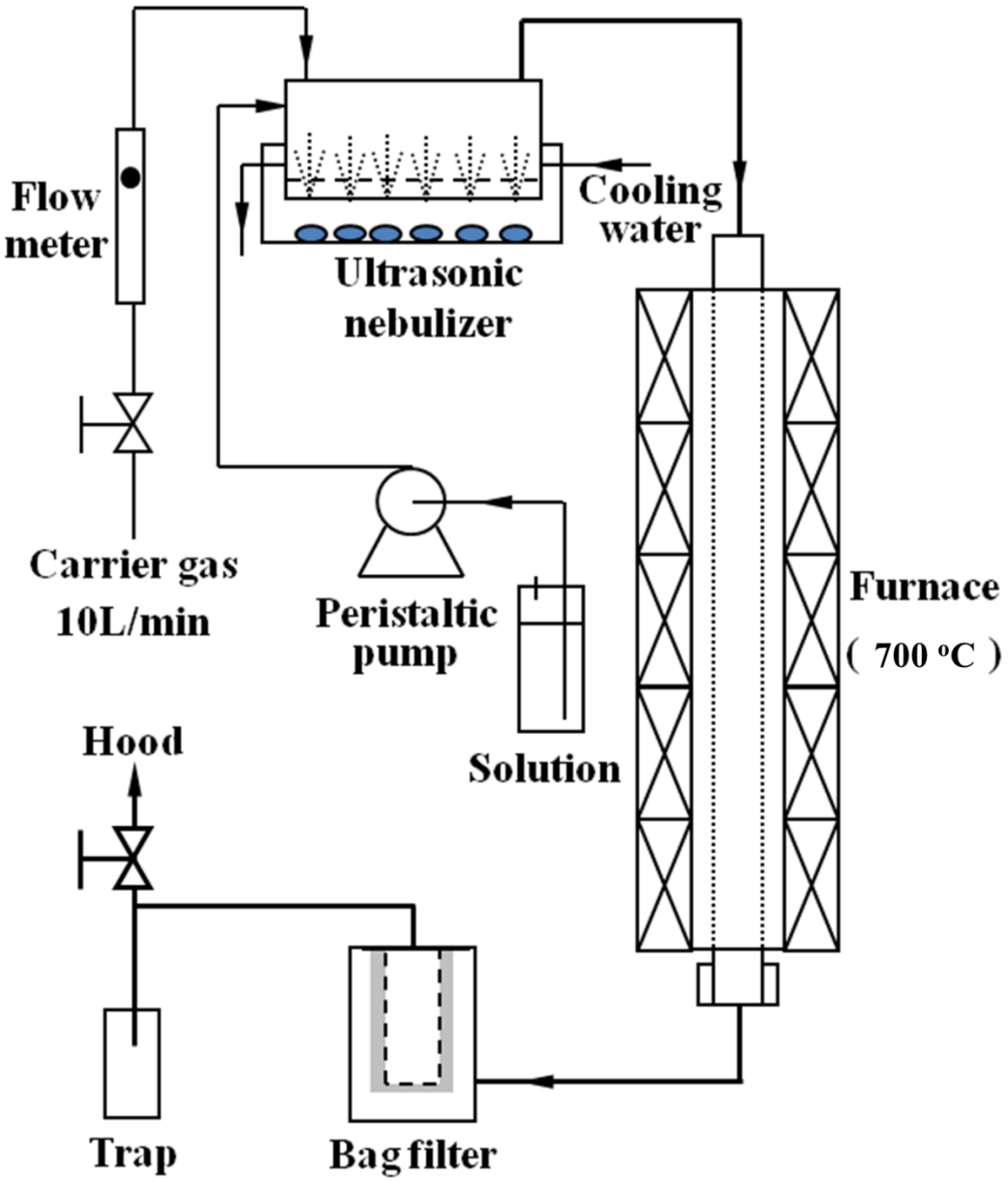

Fig. S1 Schematic diagram of ultrasonic spray pyrolysis process.

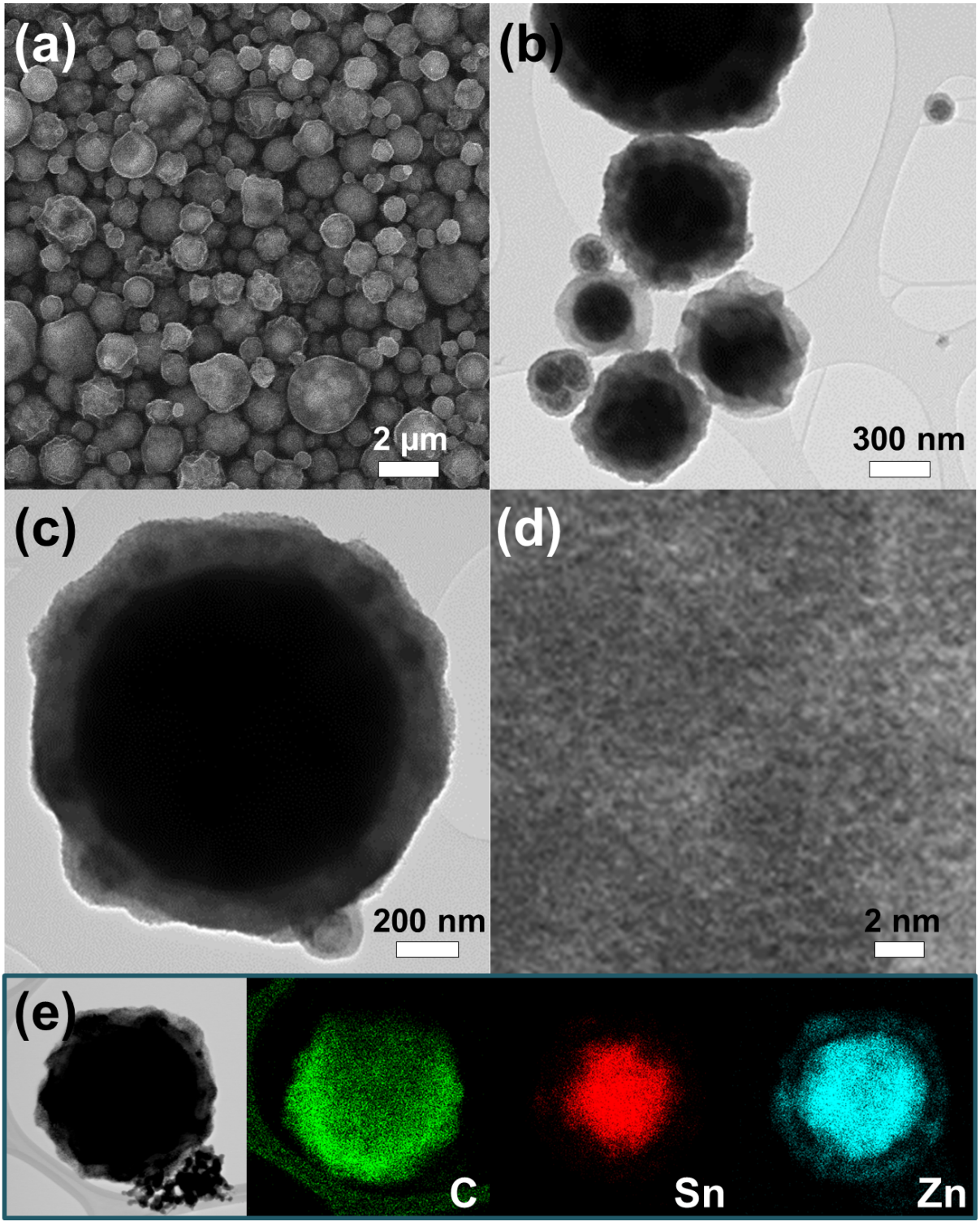

Fig. S2 Morphologies and elemental mapping images of the Zn_2SnO_4–carbon composite microspheres prepared from the spray solution with 25 g PVP.

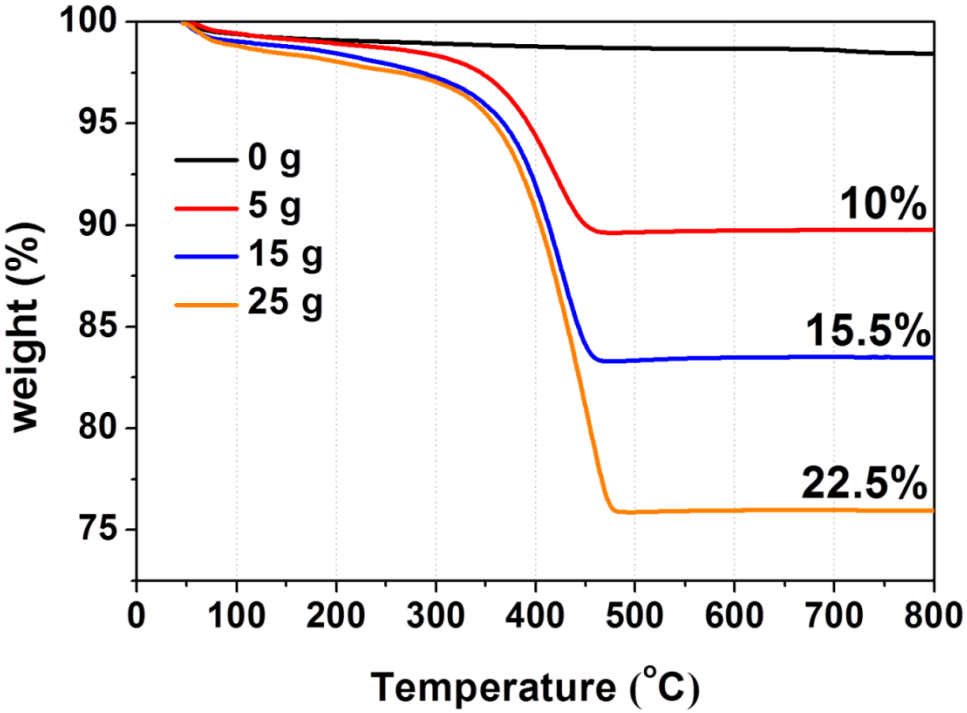

Fig. S3 Thermogravimetric (TG) curves of the bare Zn_2SnO_4 and Zn_2SnO_4-carbon composite microspheres**.**

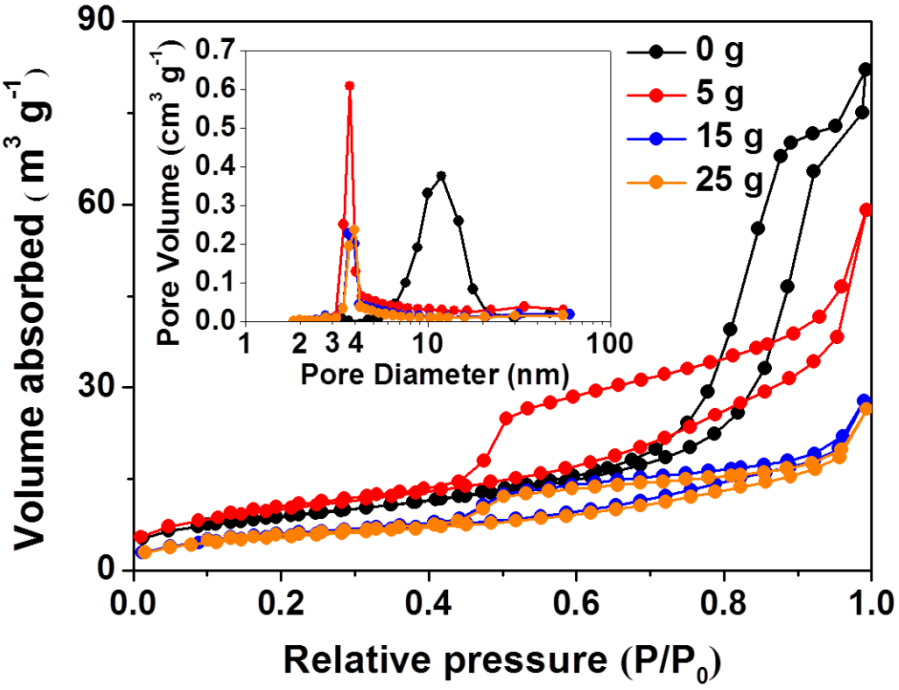

Fig. S4 N_2 adsorption and desorption isotherms and the Barrett-Joyner-Halenda (BJH) pore-size distributions of the bare Zn_2SnO_4 and Zn_2SnO_4-carbon composite microspheres.

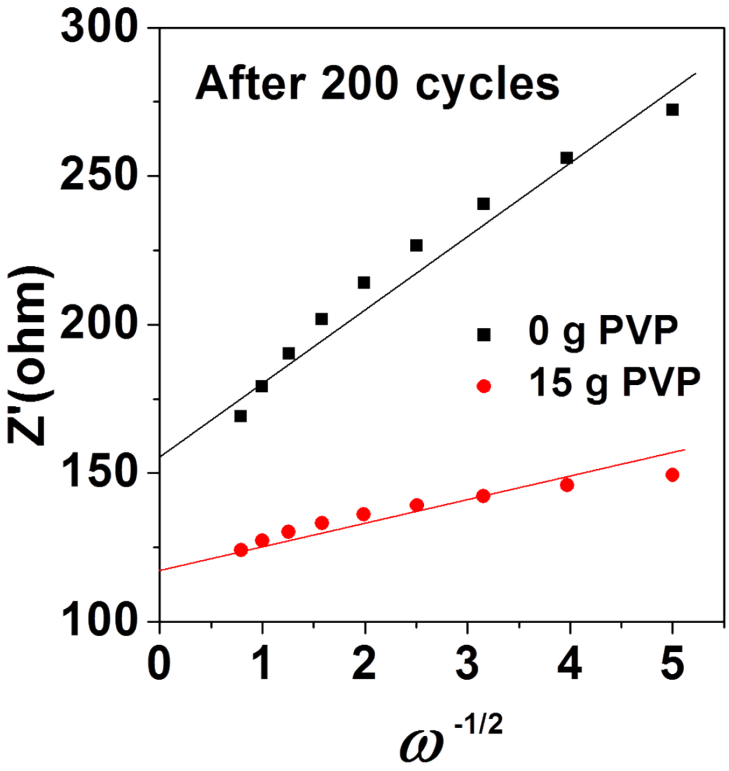

Fig. S5 Rrelationship between Z_{re} and $\omega^{-1/2}$ in the low frequency region, where ω is the angular frequency in the low frequency region ($\omega = 2\pi f$).

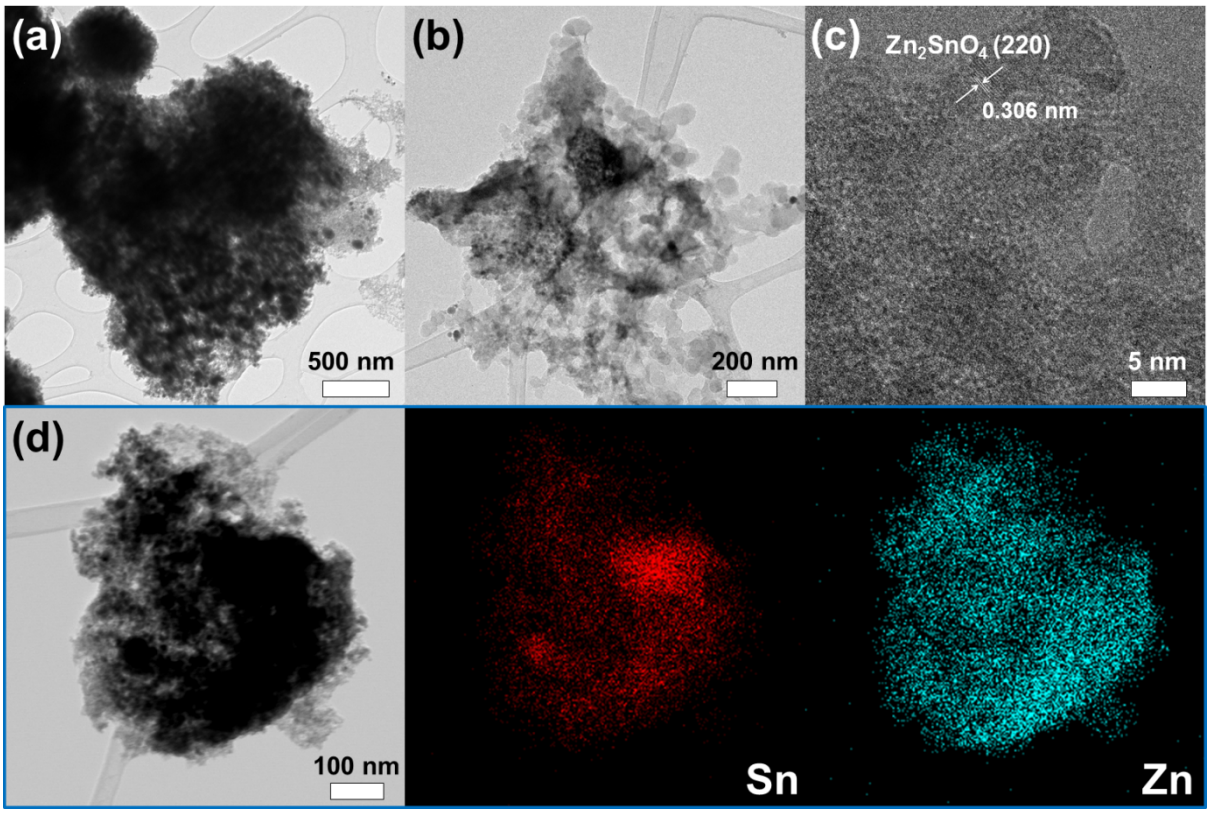

Fig. S6 Morphologies and elemental mapping images of the bare Zn_2SnO_4 microspheres after 200 cycles.

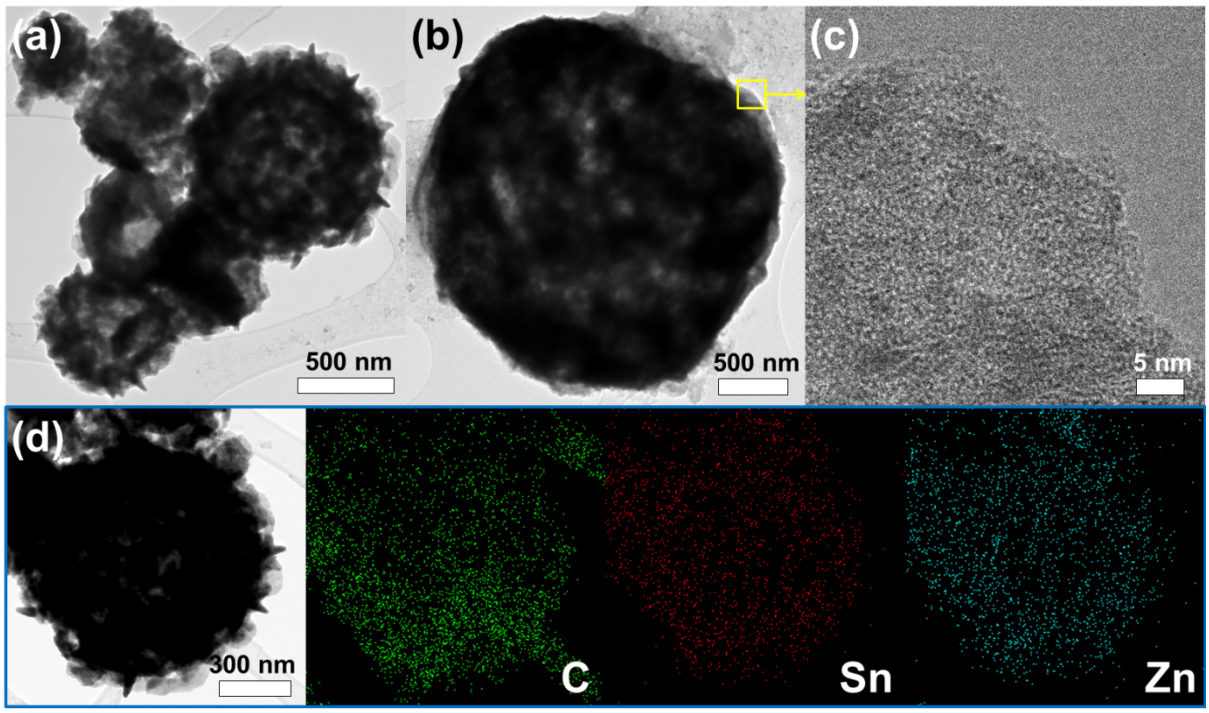

Fig. S7 Morphologies and elemental mapping images of the Zn_2SnO_4–carbon composite microspheres prepared from the spray solution with 5 g PVP after 200 cycles.

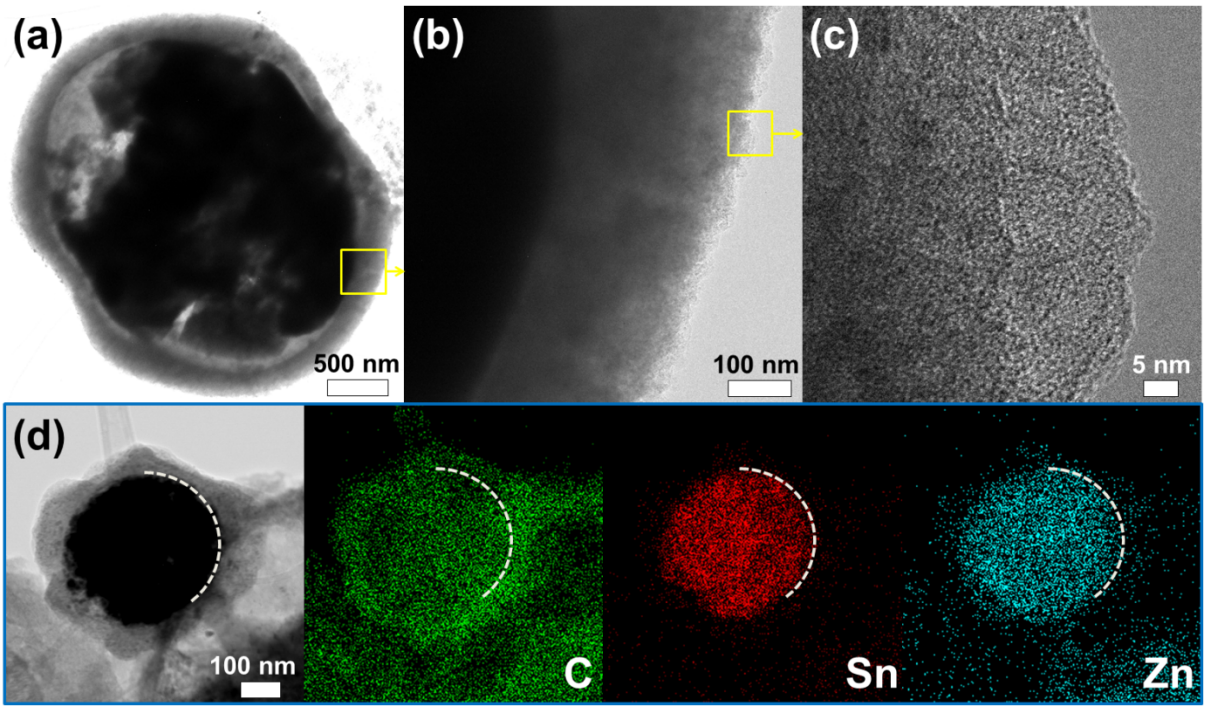

Fig. S8 Morphologies and elemental mapping images of the Zn_2SnO_4–carbon composite microspheres prepared from the spray solution with 15 g PVP after 200 cycles.

Table S1. Electrochemical properties of Zn_2SnO_4 materials with different morphologies prepared by various preparation methods.

Morphology [preparation method]	Voltage range [V]	Current density	Initial C_{dis}/C_{cha} [mA h g^{-1}]	Discharge capacity [mA h g^{-1}]	Cycle number	Ref.
Polypyrrole-coated hollow Zn_2SnO_4 boxes [microemulsion polymerization]	0.01 – 3	60 mA g^{-1}	1105.2 / 556	478.4	50	[10]
Zn_2SnO_4 nano boxes @graphene [coprecipitation]	0.01 – 2	300 mA g^{-1}	1624.7 / 1121.2	752.9	45	[11]
Zn_2SnO_4/graphene nanohybrid [hydrothermal]	0.005 – 3	800 mA g^{-1} (charge) 50 mA g^{-1} (discharge)	- / 711	500	40	[12]
Octahedral Zn_2SnO_4-graphene [hydrothermal]	0.05 – 3	200 mA g^{-1}	1223 / 674	326	50	[14]
Nanoparticles [hydrothermal]	0.05 – 3	50 mA g^{-1}	- / -	521	40	[15]
Nano size Zn_2SnO_4/C [hydrothermal]	0.05 – 3	60 mA g^{-1}	1436.8 / 880.5	564	40	[16]
Zn_2SnO_4@C/CSs [hydrothermal]	0.01 – 3	100 mA g^{-1}	1242 / 775	680	345	[17]
Zn_2SnO_4@ZIF core-shell [hydrothermal]	0.01 – 3	0.5 A g^{-1}	1125.7 / 369.2	349.2	20	[18]
Cubic [supercritical water]	0.05 – 3	0.75 mA cm^{-2}	1526 / 1093	856	50	[21]
Nanowire [vapor transport method]	0.005 – 1.5 – 3.0	120 mA g^{-1}	1650 / 670 / 1000	390 (0.005 – 1.5V) 660 (0.005 – 3V)	50	[23]
Cubic [hydrothermal]	0.05 – 3	100 mA g^{-1}	1509 / -	580	50	[24]
Irregular [hydrothermal]	0.05 – 3	50 mA g^{-1}	1903.6 / 1045.5	645	20	[25]
Cubic [solid state reaction]	0.05 – 3	50 mA g^{-1}	2054 / 1025	689	50	[26]
Cubic [hydrothermal]	0.05 – 3	50 mA g^{-1}	1437 / 921	775	20	[27]
Carbon coated Zn_2SnO_4 [hydrothermal]	0.05 – 3	200 mA g^{-1}	1248.8 / 873.2	341	45	[28]
Hollow Zn_2SnO_4 boxes@C [calcined process]	0.01 – 2	300 mA g^{-1}	- / 616		45	[29]
Spherical Zn_2SnO_4@C core-shell [spray pyrolysis]	0.001 – 3	1 A g^{-1}	1526 / 873	770	120	This work

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