

Supporting Information

Hybrid CuSn nanospheres functionalizing Cu/Sn co-doping hollow carbon nanofibers as anode materials for sodium-ion batteries

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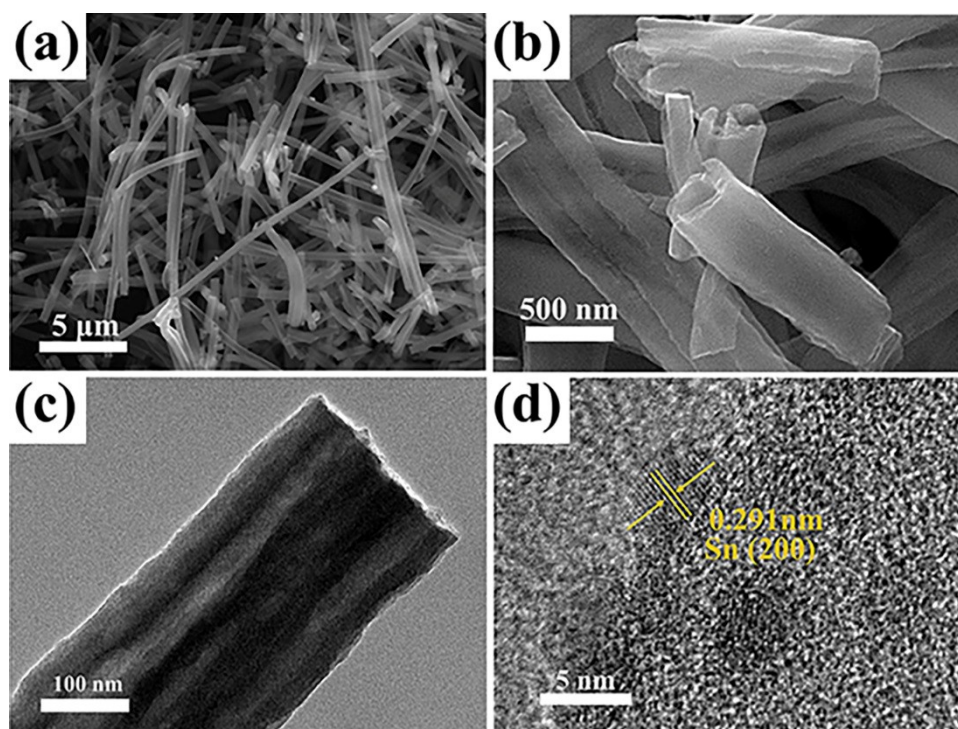


Figure S1. (a,b) FE-SEM images of Sn-SnO_x@MCNF; (c,d) TEM and HRTEM image of Sn-SnO_x@MCNF.

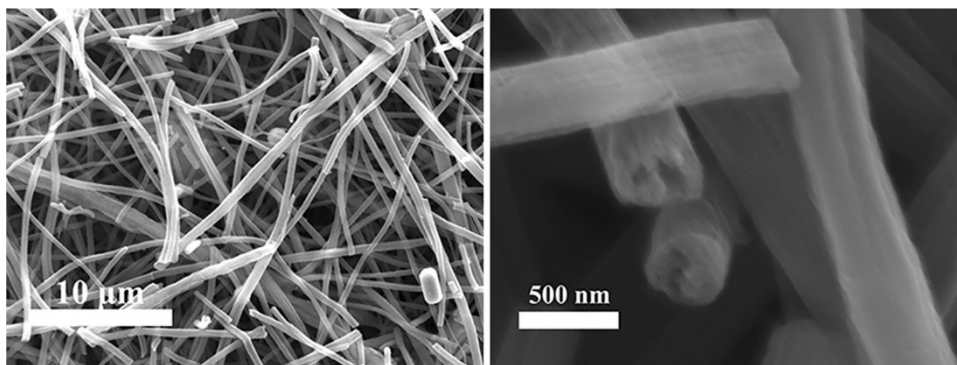


Figure S2. FE-SEM images of Cu@MCNF.

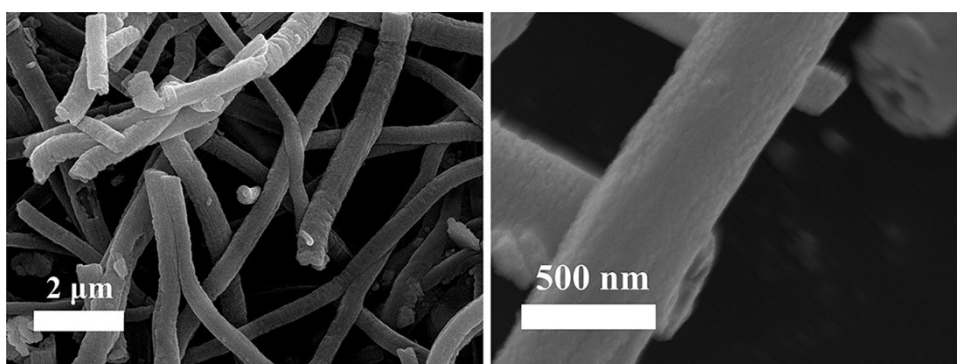


Figure S3. FE-SEM images of pure MCNF.

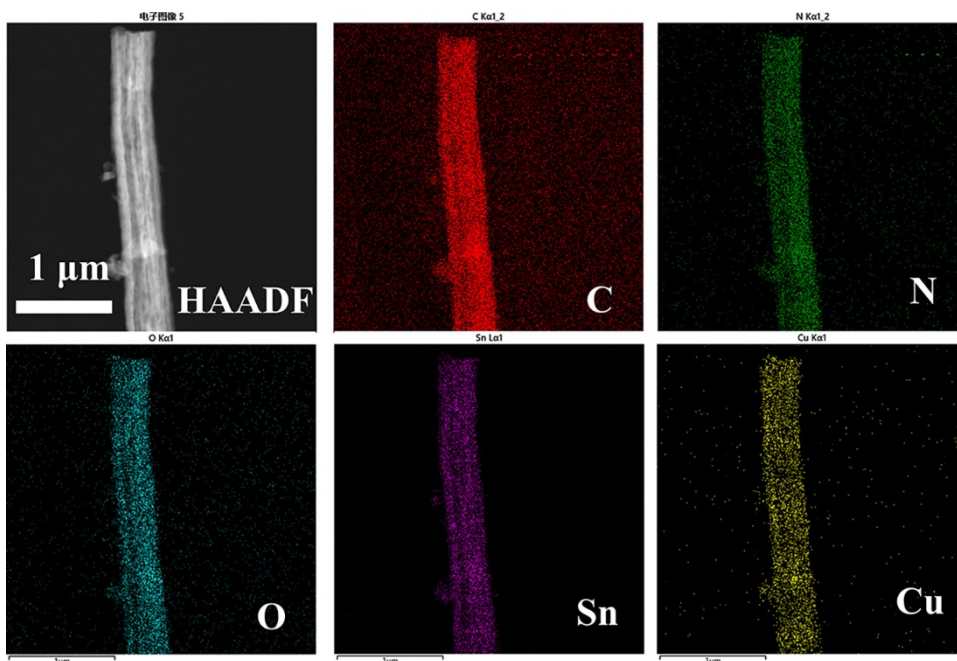


Figure S4. TEM-mapping images of CuSn/C@MCNF.

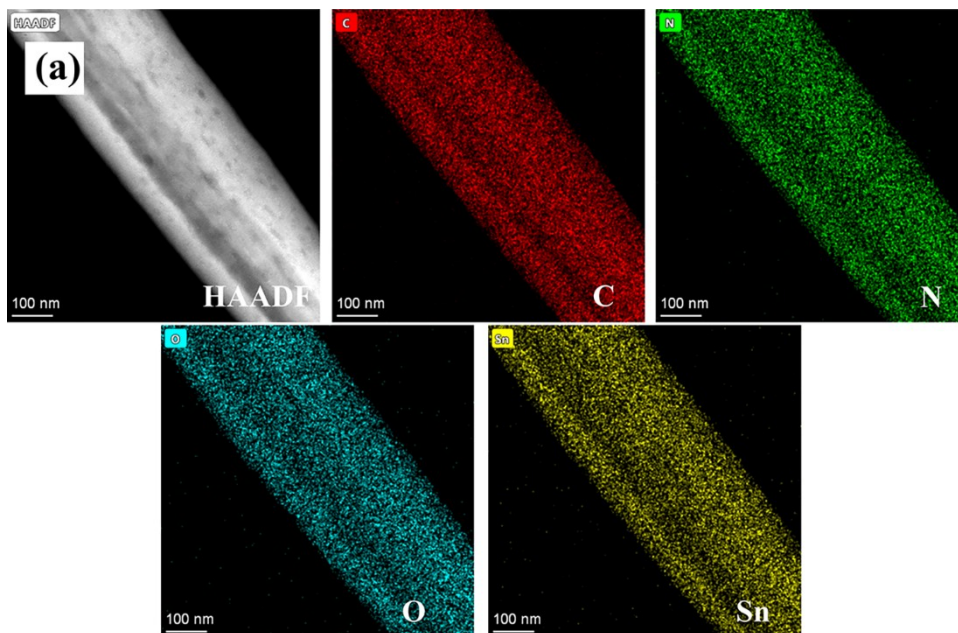


Figure S5. TEM-mapping images of Sn-SnO_x@MCNF.

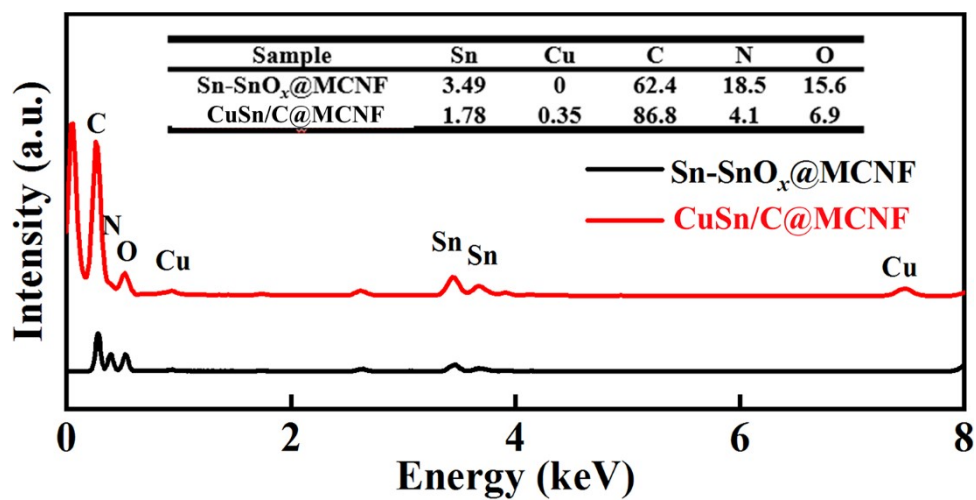


Figure S6. EDS spectra and atomic concentrations of elements in CuSn/C@MCNF and Sn-SnO_x@MCNF obtained from TEM-mapping analysis.

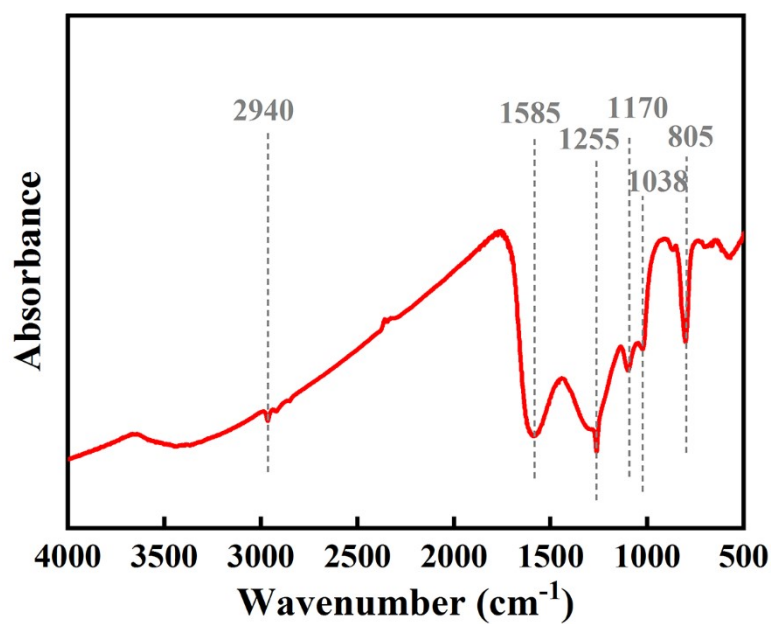


Figure S7. FTIR spectrum of CuSn/C@MCNF.

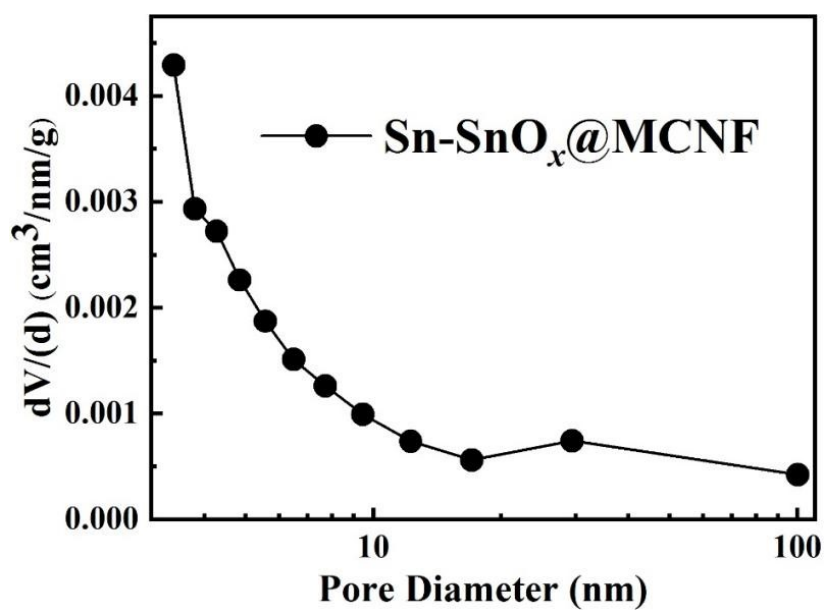


Figure S8. Pore size distribution of Sn-SnO_x@MCNF.

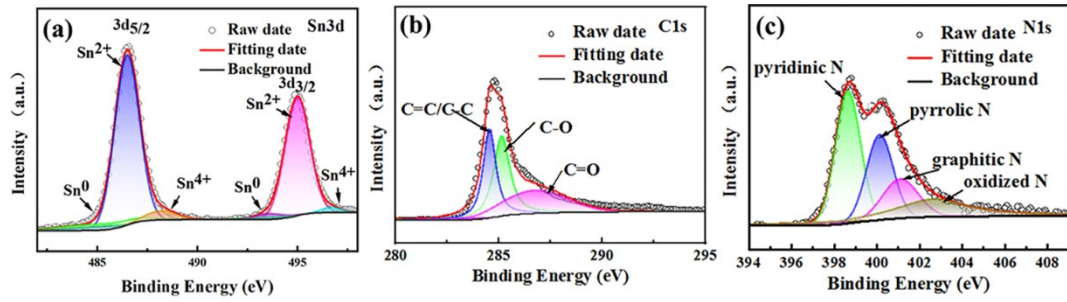


Figure S9. The high-resolution XPS spectrum of (a) Sn3d, (b) C1s, (c) N1s of Sn-SnO_x@MCNF.

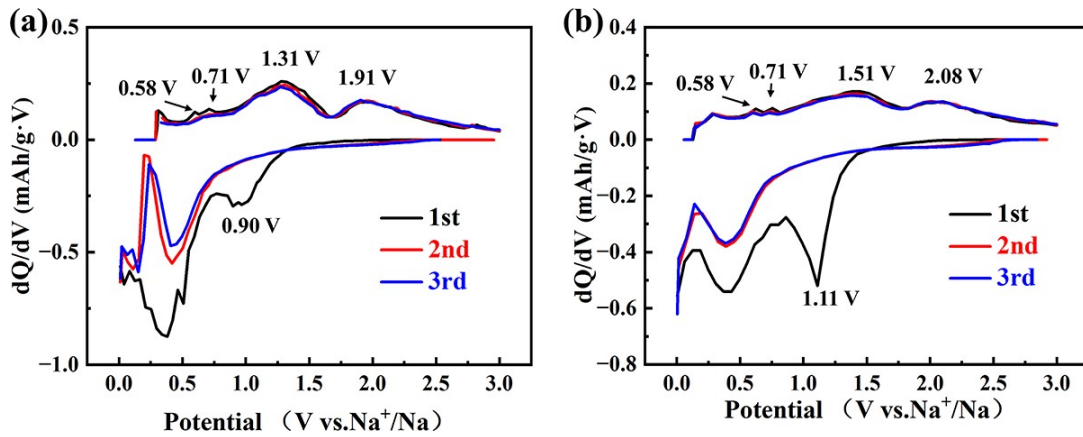


Figure S10. The dQ/dV curves for the first three cycles of (a) Sn-SnO_x@MCNF and (b) CuSn/C@MCNF.

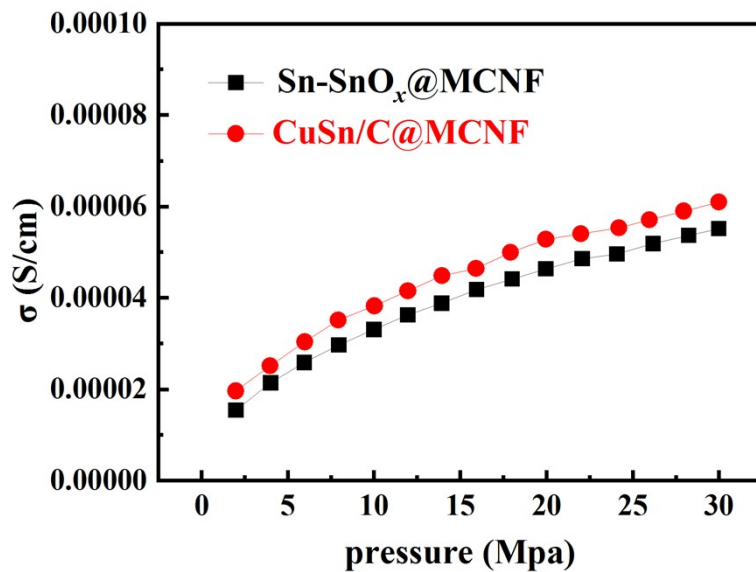


Figure S11. The electrical conductivity of Sn-SnO_x@MCNF and CuSn/C@MCNF at different pressures.

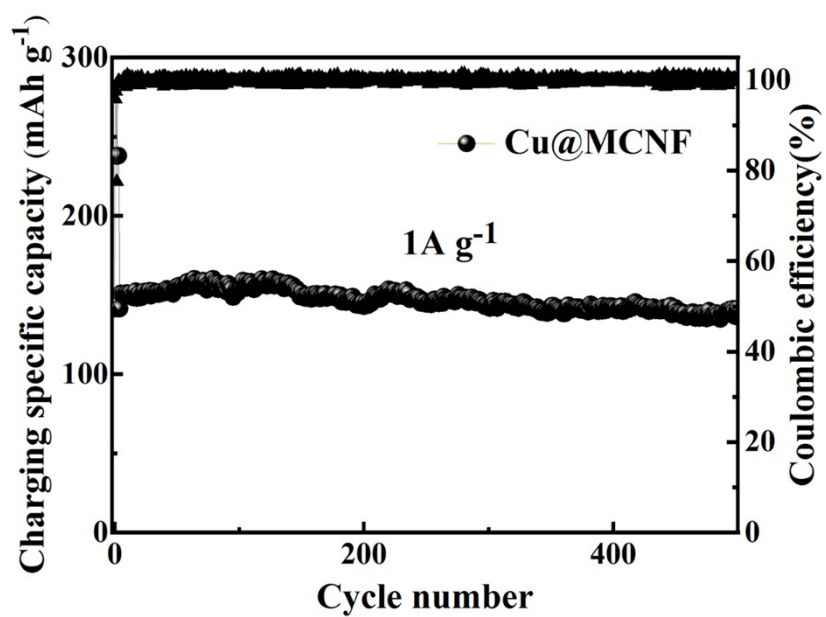


Figure S12. Discharge/charge curves of the Cu@MCNF electrode for 500 cycles.

Table S1. Atomic concentrations (at.%) of elements in Sn-SnO_x@MCNF and CuSn/C@MCNF obtained from the corresponding XPS analysis.

Sample	Sn/(at.%)	Cu/(at.%)	C/(at.%)	N/(at.%)	O/(at.%)
Sn-SnO_x@MCNF	3.49	0	62.4	6.92	9.25
CuSn/C@MCNF	1.35	0.61	79.17	9.04	9.83

Table S2. The EIS fitting parameters of Sn-SnO_x@MCNF and CuSn/C@MCNF electrodes after three cycles at a current density of 0.1 A g⁻¹.

Sample	R_{ct}(Ω)	R_s(Ω)
Sn-SnO_x@MCNF	169.9	9.679
CuSn/C@MCNF	82.24	5.696