Supporting Information

Graphite Particles Modified by ZnO Atomic Layer Deposition for Li-ion Battery Anode

Ahmad Helaley [a], Han Yu [b], and Xinhua Liang [a,] *

[a] Department of Energy, Environmental and Chemical Engineering, Washington University in St. Louis, St. Louis, MO 63130, USA

[b] Linda and Bipin Doshi Department of Chemical and Biochemical Engineering, Missouri University of Science and Technology, Rolla, MO 65409, USA

* Corresponding author. Email: xinhua.liang@wustl.edu

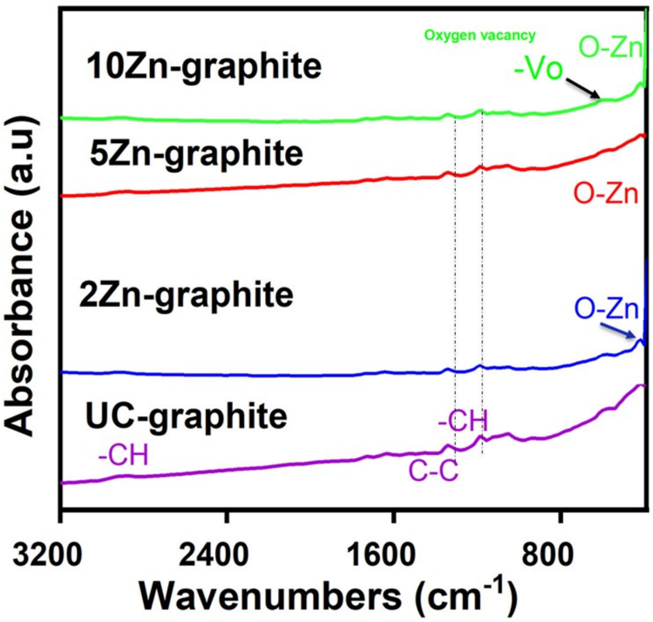


Fig. S1. FTIR spectra of pristine graphite particles and graphite particles coated with various number of ZnO ALD cycles.

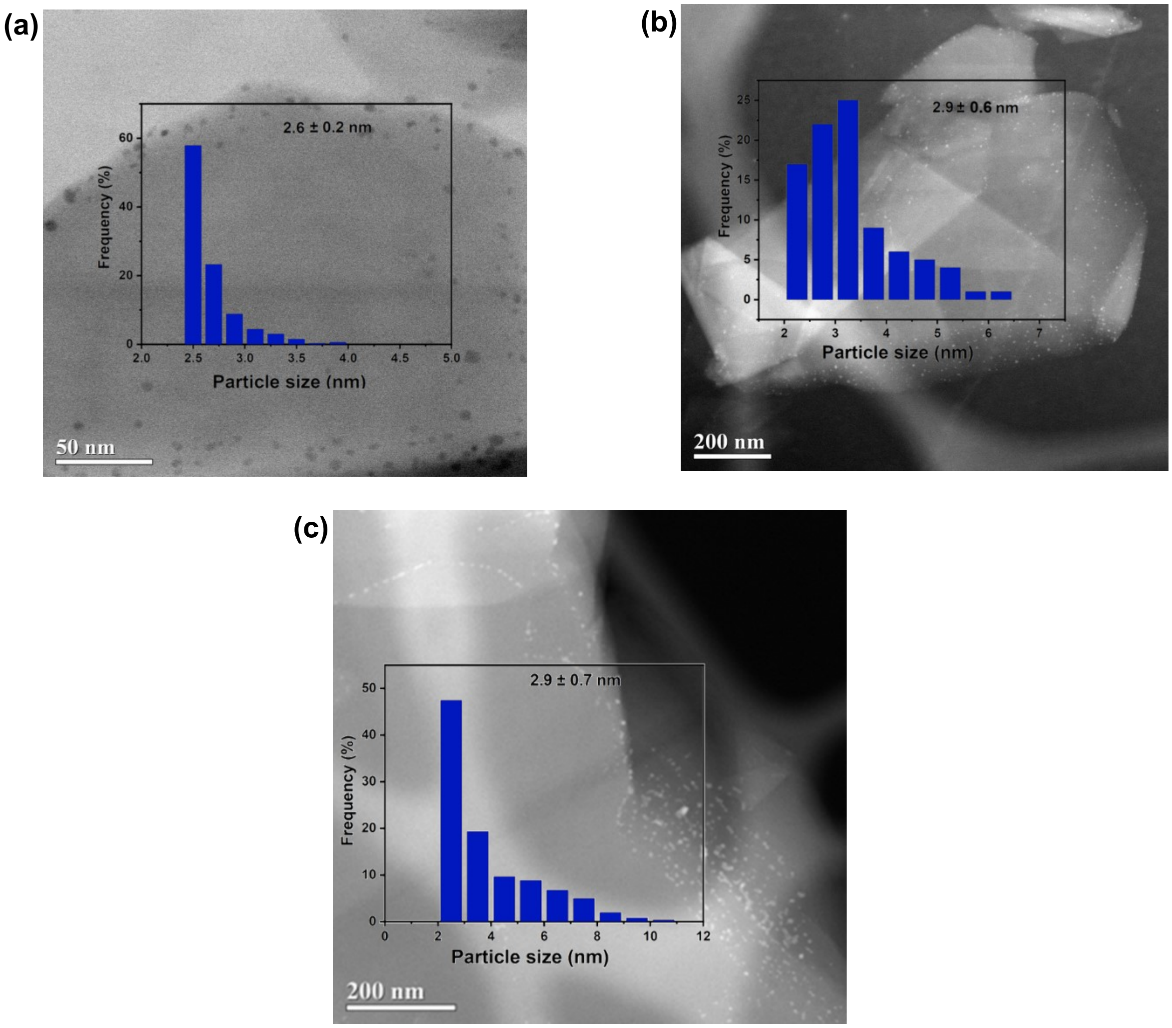


Fig. S2. TEM images of (a) 2Zn-graphite powders, (b) 5Zn-graphite powders, and (c) 10Zn-graphite powders. The inset image shows the size distributions of ZnO nanoparticles.

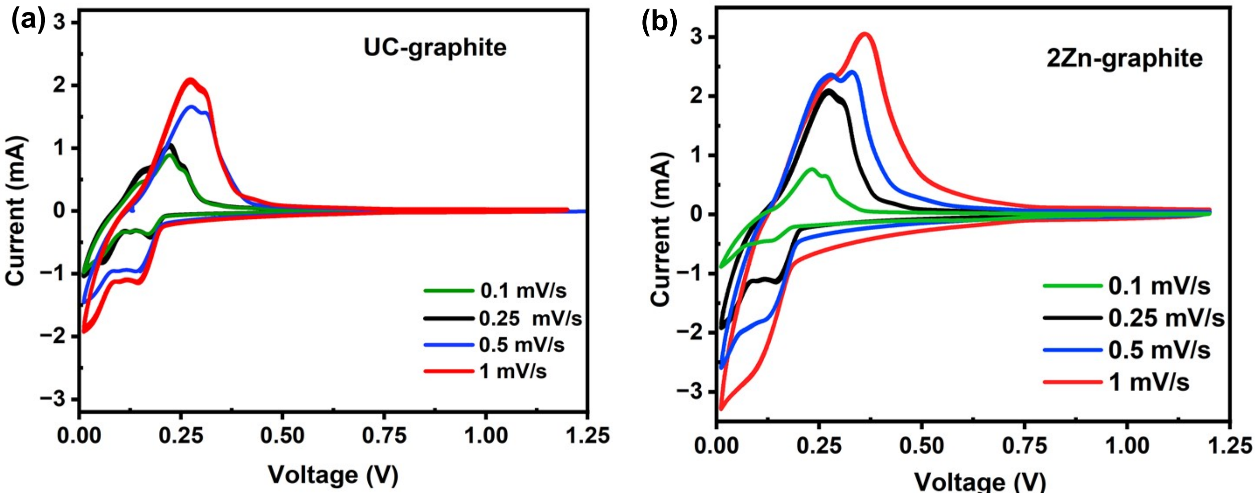


Fig. S3. The first cycle of the CV profile at various scan rates for (a) UC-graphite anode (b) 2Zn-graphite anode.

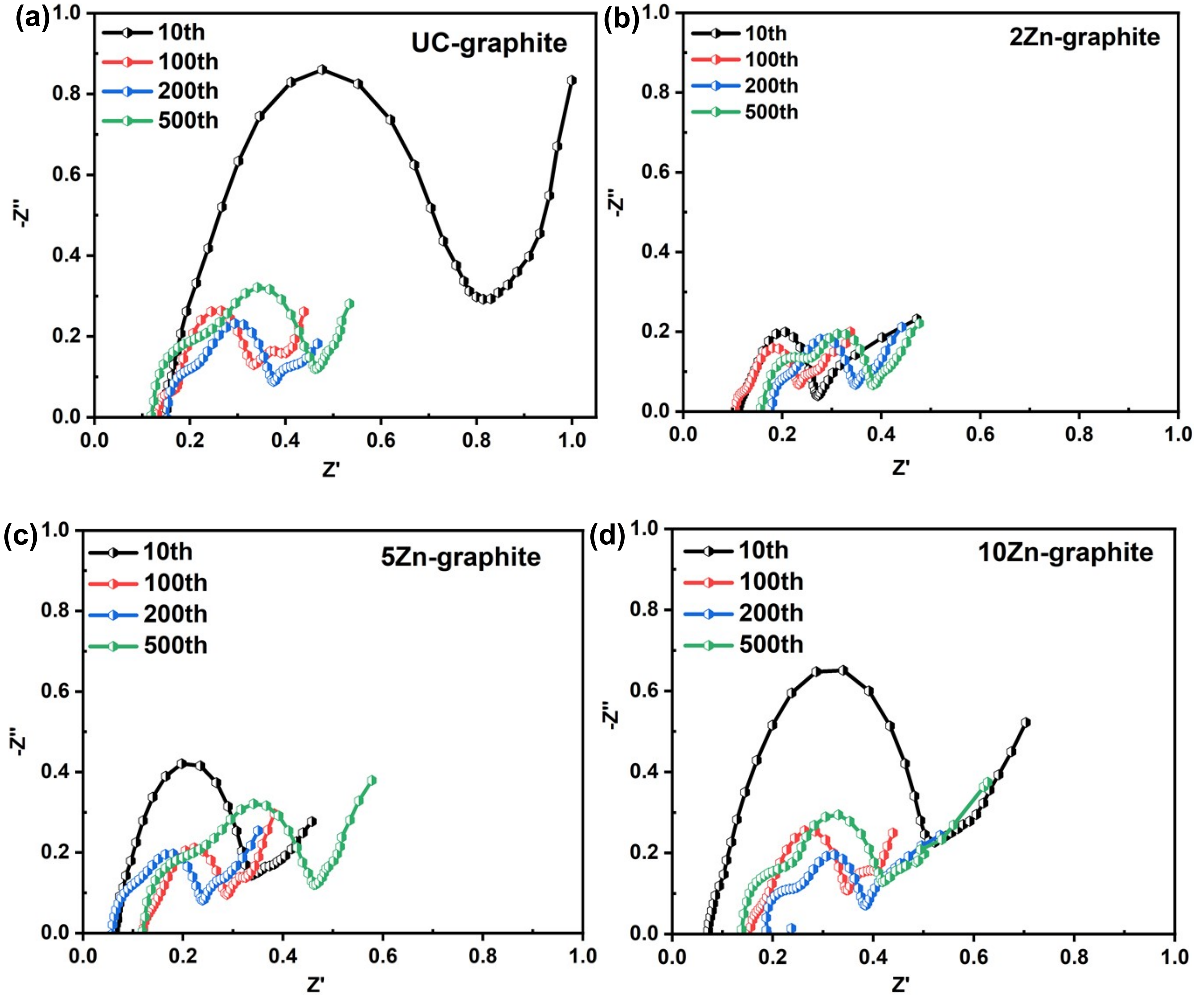


Fig. S4. After normalization, the Nyquist plot of anode samples tested at a 1C rate with a potential range of 0.1 V - 3.0 V for the 10th, 100th, 200th, and 500th charge/discharge cycles for (a) UC-graphite, (b) 2Zn-graphite, (c) 5Zn-graphite, and (d) 10Zn-graphite.

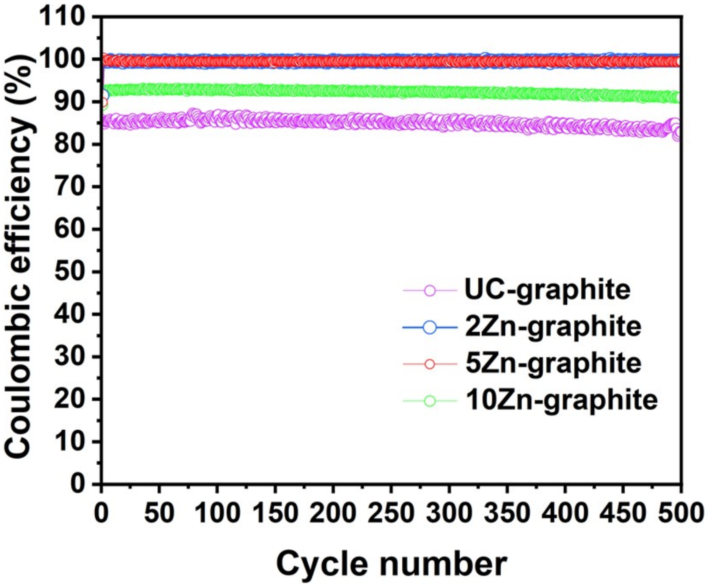


Fig. S5. Coulombic efficiencies of graphite electrodes.

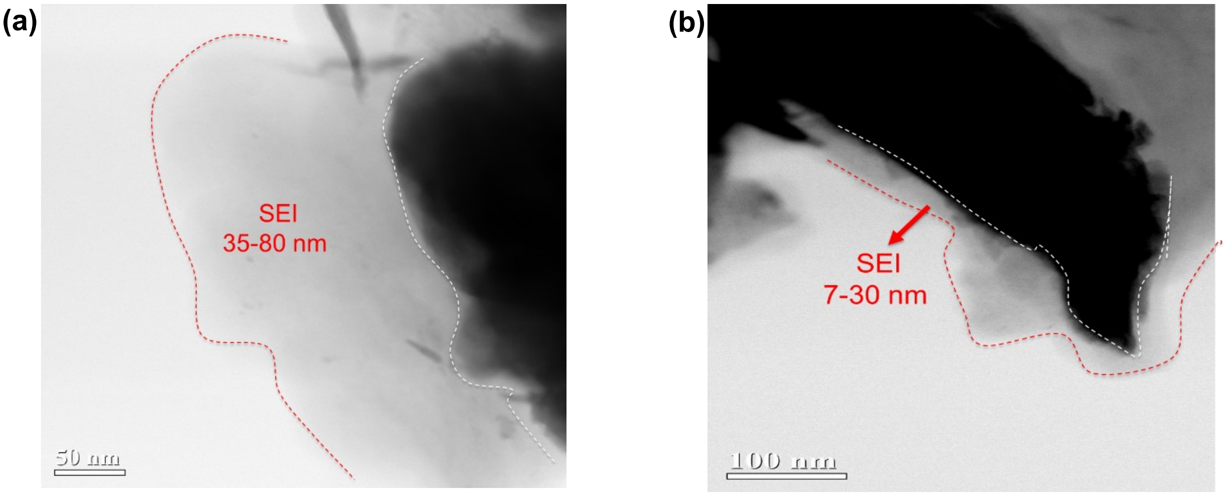
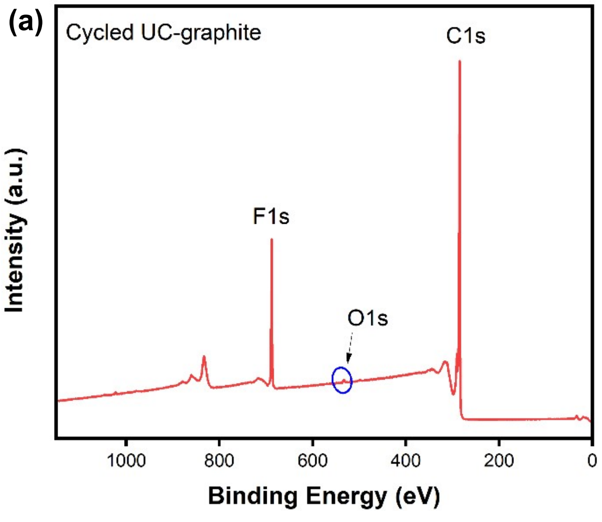


Fig. S6. TEM images of the (a) cycled UC-graphite electrode and (b) cycled 2Zn-graphite electrode after 500 cycles of charge/discharge.



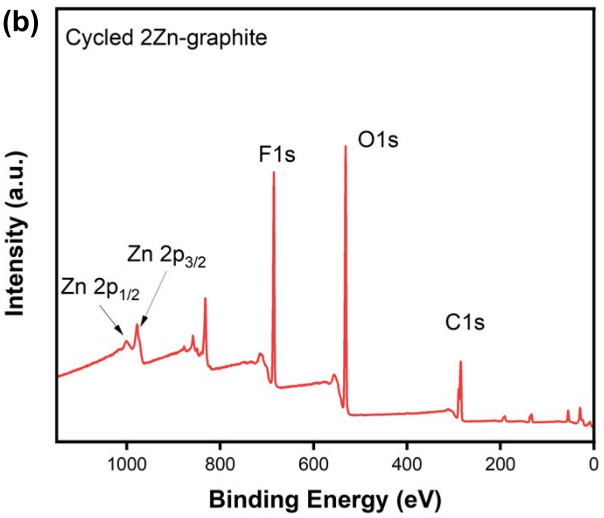


Fig. S7. Scan survey of (a) cycled UC-graphite electrode, and (b) cycled 2Zn-graphite electrode after 100 cycles of charge/discharge.

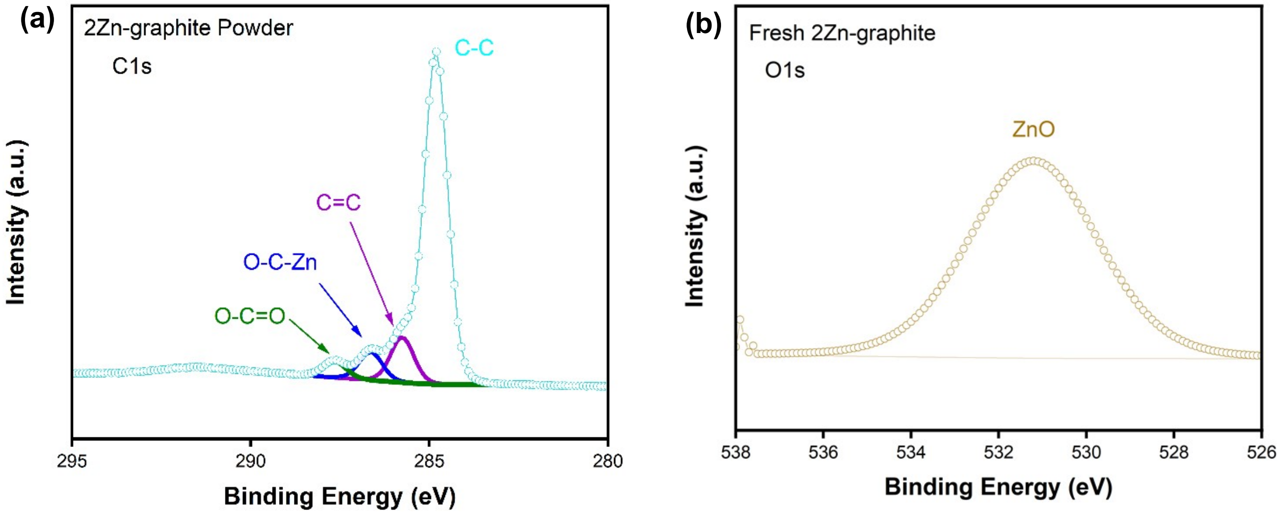


Fig. S8. XPS spectra: (a) C1s of fresh 2Zn-graphite powders, and (b) O1s of fresh 2Zn-electrode.

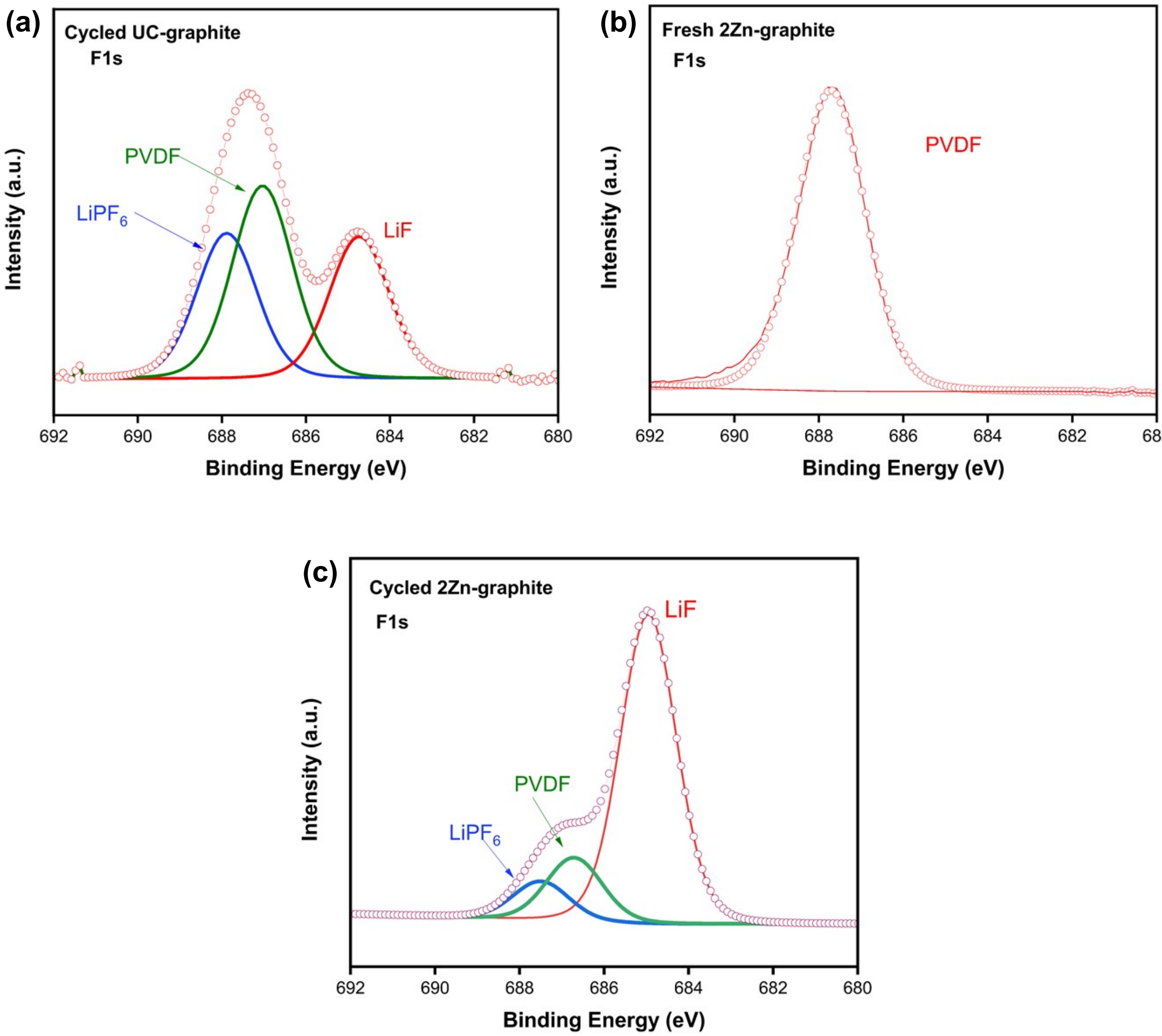


Fig. S9. XPS F1s spectra of (a) cycled UC-graphite, (b) fresh 2Zn-graphite, and (c) cycled 2Zn-graphite.

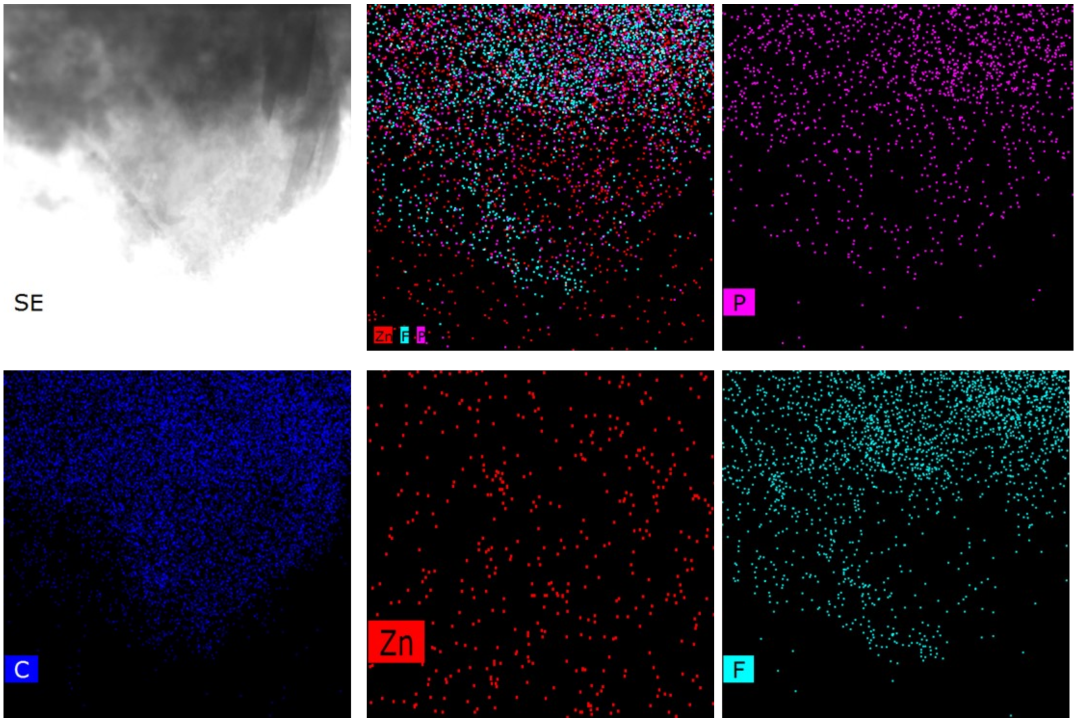


Fig. S10. TEM image and EDX mapping of 2Zn-graphite electrode after 500 cycles of charge/discharge.

Table S1. Comparative analysis of rate performance for 2Zn-graphite and related graphite-based anodes reported in recent studies.

Cell system	Anode structure	Rate Performance (mAh g^{-1})	Electrochemical Stability Window (V)	Reference
Graphite // Li	Uncoated graphite	26@5C	0.01-1.5 V	This work
	2Zn-graphite	109@5C		
Graphite // Li	Bare graphite	25@4C 10 @6C	0.01-1.5 V	[1]
	Aligned graphene array +graphite	75 @4C 50@6C		
Graphite // Li	Bare graphite	50 @ 5C	0-1.5 V	[2]
	Graphite coated with amorphous carbon	100 @5C		
Graphite // Li	Pristine graphite	90@4C 80@6C	0-1.5 V	[3]
	P-S-graphite	100@4C 90@6C		
Graphite // Li	Graphite bare	117@2C	0.01-1.2 V	[4]
	Graphite with heat treatment	145@2C		

References:

[1] C. Zhang, L. Dong, N. Zheng, H. Zhu, C. Wu, F. Zhao, et al., Aligned graphene array anodes with dendrite-free behavior for high-performance Li-ion batteries, *Energy Storage Materials*, vol. **37**, pp. 296-305, 2021.

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