

Supplementary materials

Atomic layer deposition of ZnO/TiO₂ nanolaminates as ultra-long life anode material for lithium-ion batteries

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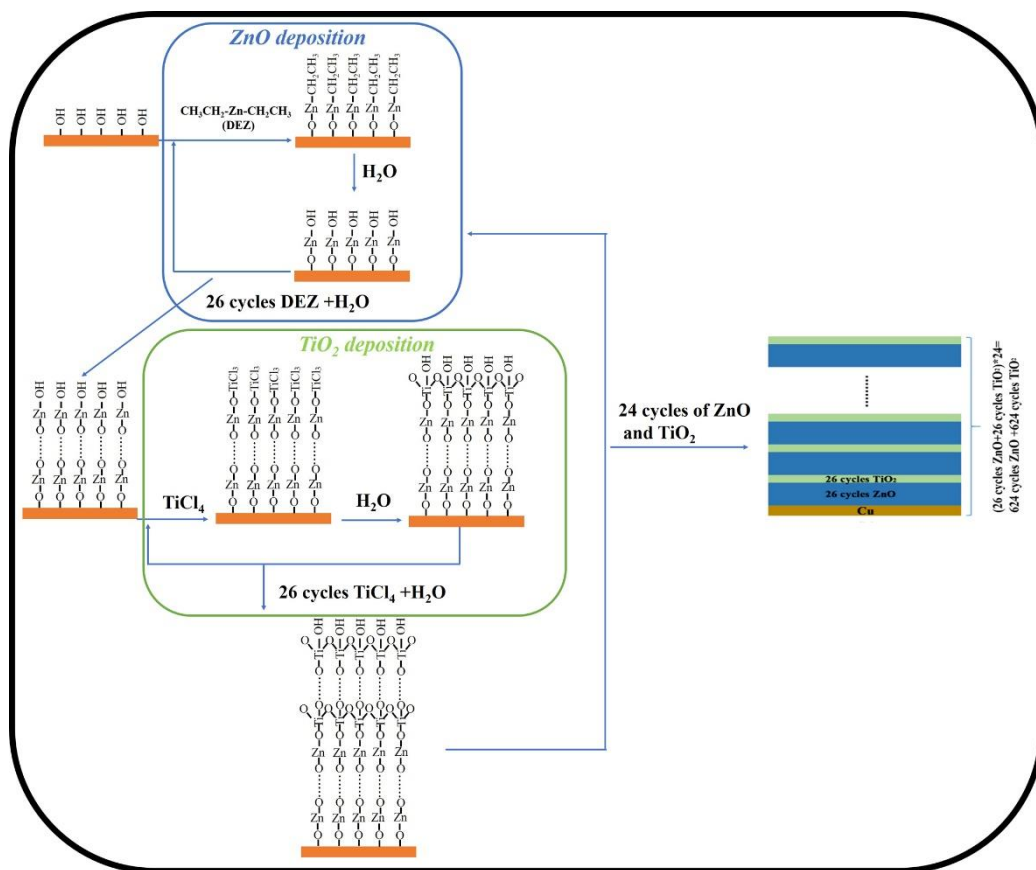


Figure S1. The schematic of ALD deposition process for ZnO/TiO₂ nanolaminates.

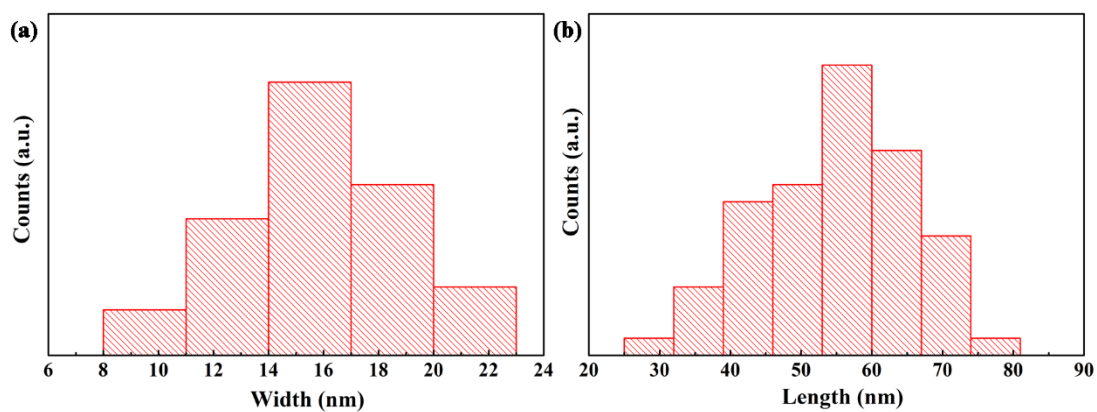


Figure S2. (a) Width and (b) length distribution of spindly grains for pure ZnO.

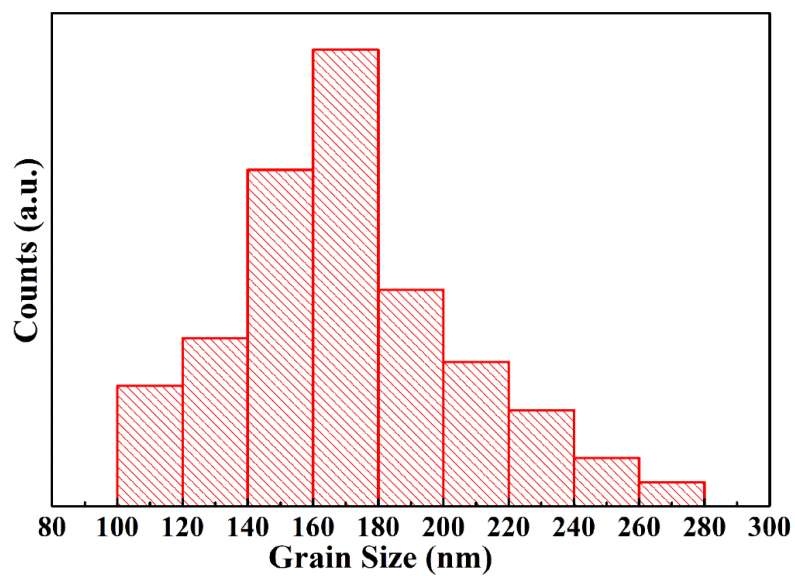


Figure S3. Grain size distribution of ZnO/TiO₂ nanolaminates.

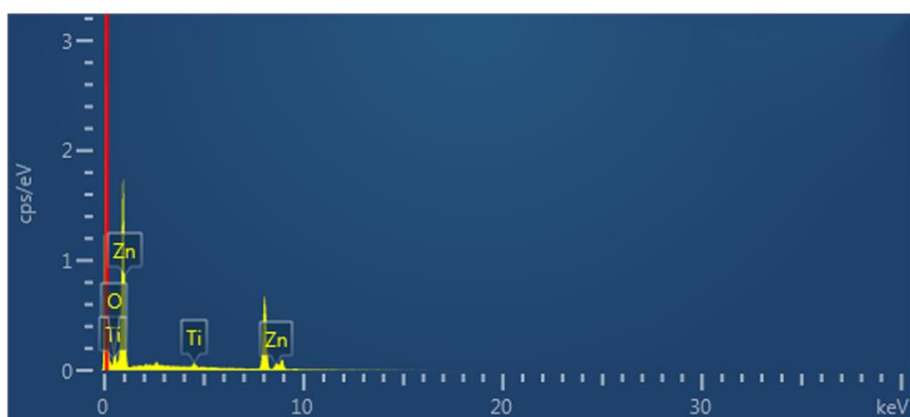


Figure S4. EDS spectrum of ZnO/TiO₂ nanolaminates.

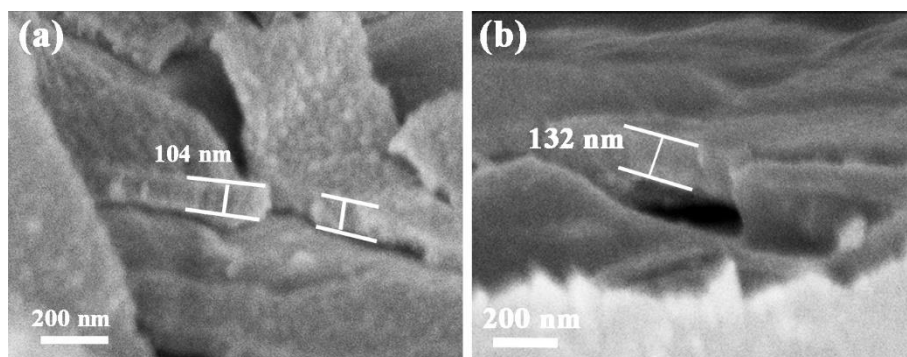


Figure S5. Cross-section SEM images of (a) pristine ZnO films and (b) ZnO/TiO₂ nanolaminates.

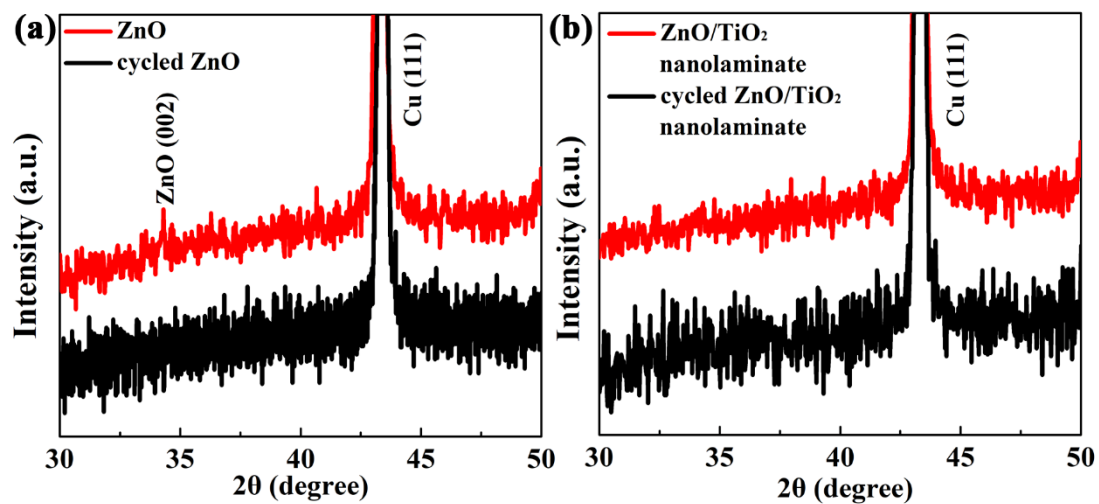


Figure S6. XRD spectra of (a) pure ZnO and (b) ZnO/TiO₂ nanolaminates before and after cycling

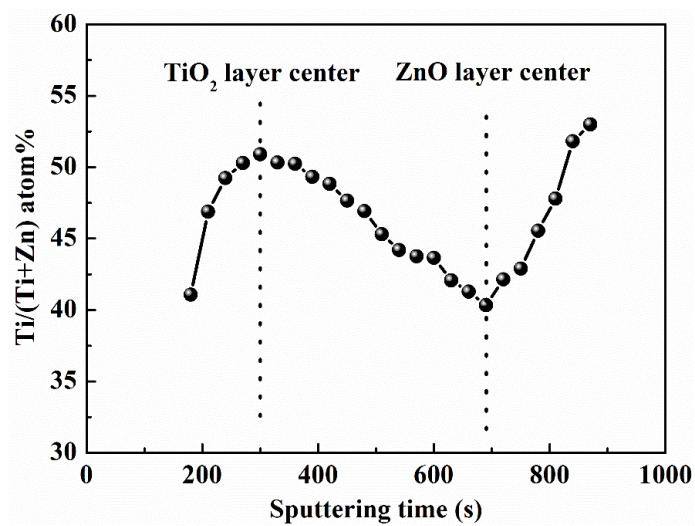


Figure S7. XPS depth profile of Ti/(Ti+Zn) atom% for ZnO/TiO₂ nanolaminates.

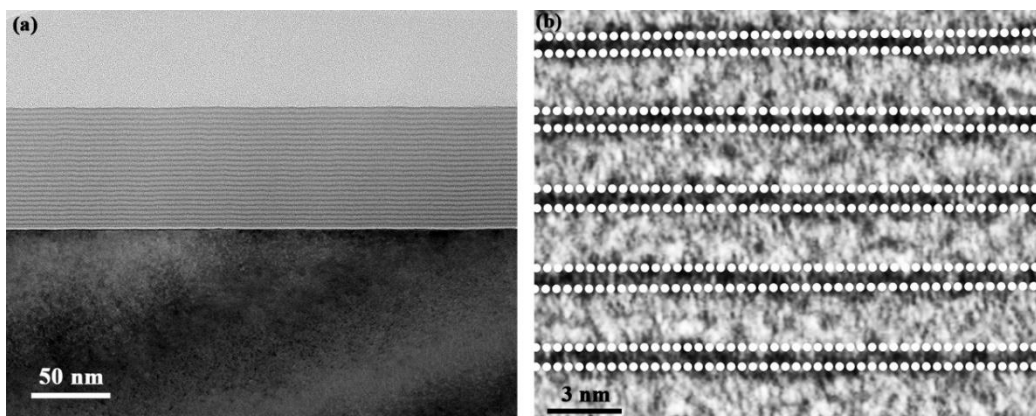


Figure S8. TEM images of (16 cycles ZnO/16 cycles TiO₂)*24 nanolaminates with different magnification.

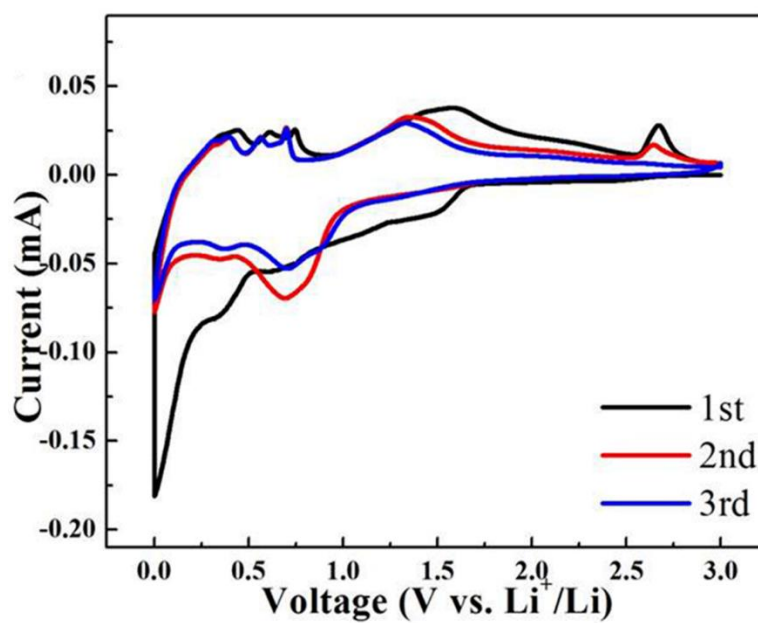


Figure S9. CV curves of pristine ZnO films electrodes for the initial three cycles at the scan rate of 0.3 mV/s in the voltage range of 0-3 V.

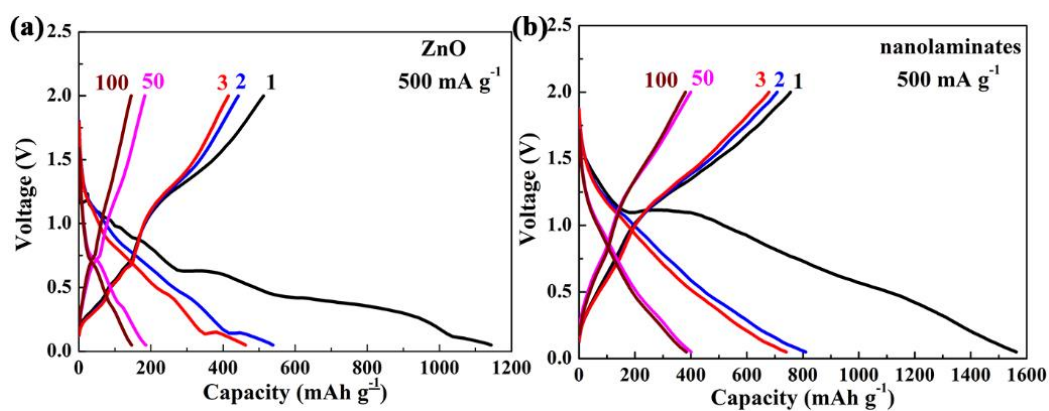


Figure S10. Discharge/charge profiles of (a) ZnO and (b) ZnO/TiO₂ nanolaminates at 500 mA g⁻¹ within 0.05-2.0 V.

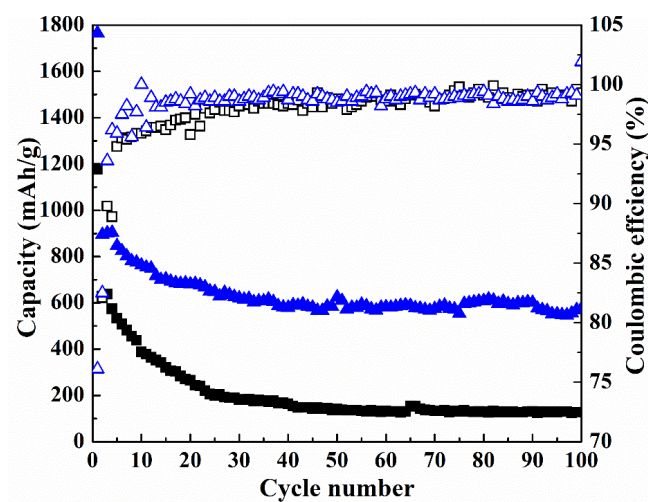


Figure S11. Cycling performance and CE of ZnO/TiO₂ nanolaminates and pristine ZnO films at 200 mA/g for 100 cycles in the potential range of 0.05-2.0 V.

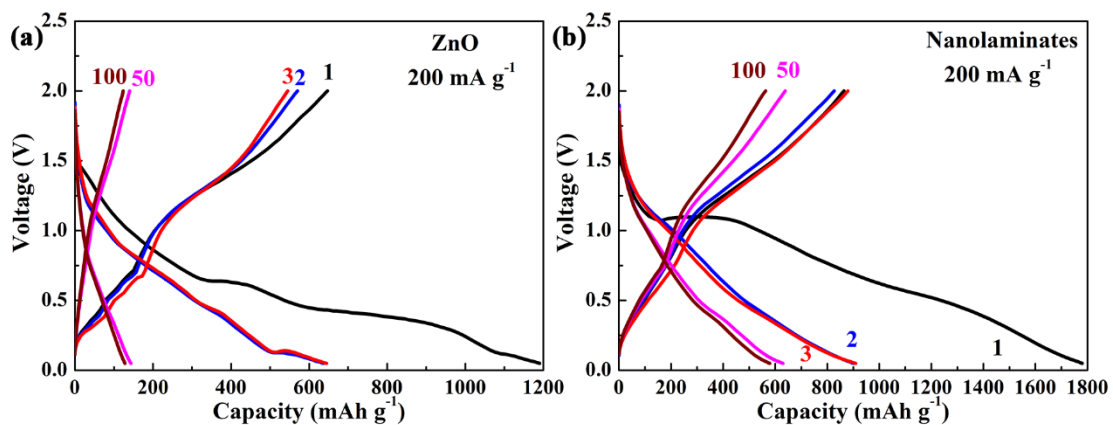


Figure S12. Discharge/charge profiles of (a) ZnO and (b) ZnO/TiO₂ nanolaminates at 200 mA g⁻¹ within 0.05-2.0 V.

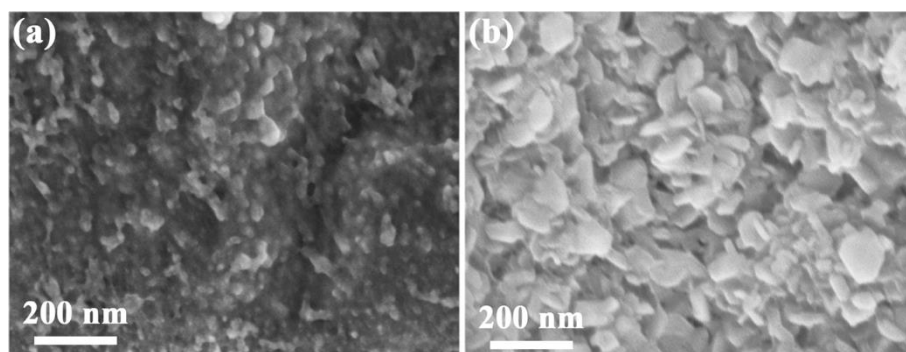


Figure S13. SEM images of (a) pristine ZnO films and (b) ZnO/TiO₂ nanolaminates after 100 cycles charging-discharging at 500 mA g⁻¹.

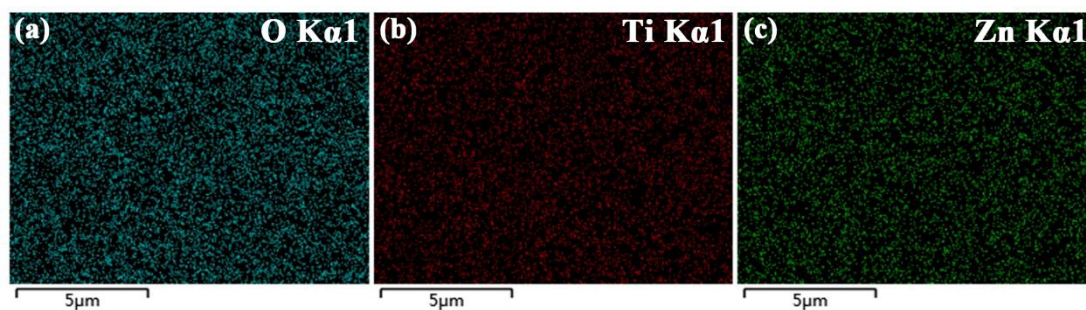


Figure S14. EDS mapping results of ZnO/TiO₂ nanolaminates after 100 cycling of 500 mA g⁻¹.

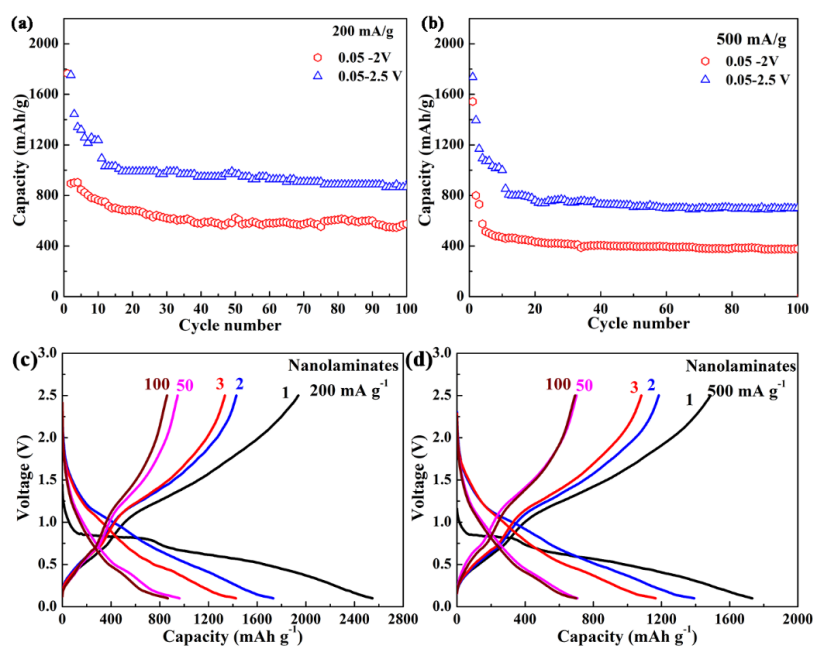


Figure S15. Cycling performance of ZnO/TiO₂ nanolaminates in the potential range of 0.05-2.0 V and 0.05-2.5 V. (a) 200 mA g⁻¹ and (b) 500 mA g⁻¹. Discharge/charge profiles of ZnO/TiO₂ nanolaminates at within 0.05-2.5 V with 200 mA g⁻¹ and (b) 500 mA g⁻¹.

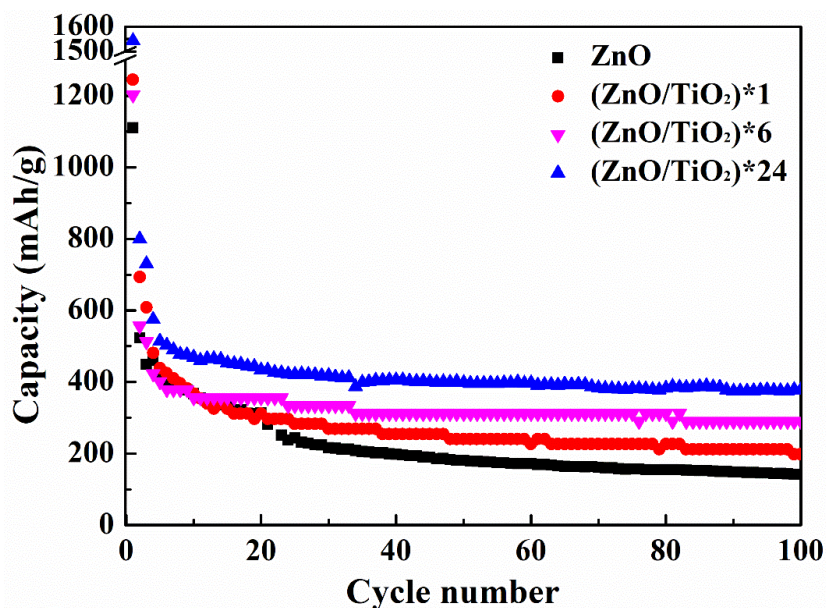


Figure S16. Cycling performance of different ZnO/TiO₂ nanolaminates based anode.

We also explored the performance of (ZnO/TiO₂)*1 and (ZnO/TiO₂)*6 nanolaminate by fixing the total deposition cycles of 624 cycles ZnO and 624 cycles TiO₂. Please see Fig. S14, it can be seen that the nanolaminate structure with more layers (thinner ZnO thickness) possesses the better cycling stability.