

Supporting Information

Intercalation Based Tungsten Disulfide (WS_2) Li-ion Battery Anode Grown by Atomic Layer Deposition

Dip K. Nandi, Uttam K. Sen, Arpan Dhara, Sagar Mitra* and Shaibal K. Sarkar*

Department of Energy Science and Engineering, IIT Bombay, Mumbai 40 076.

**email: sagar.mitra@iitb.ac.in and shaibal.sarkar@iitb.ac.in*

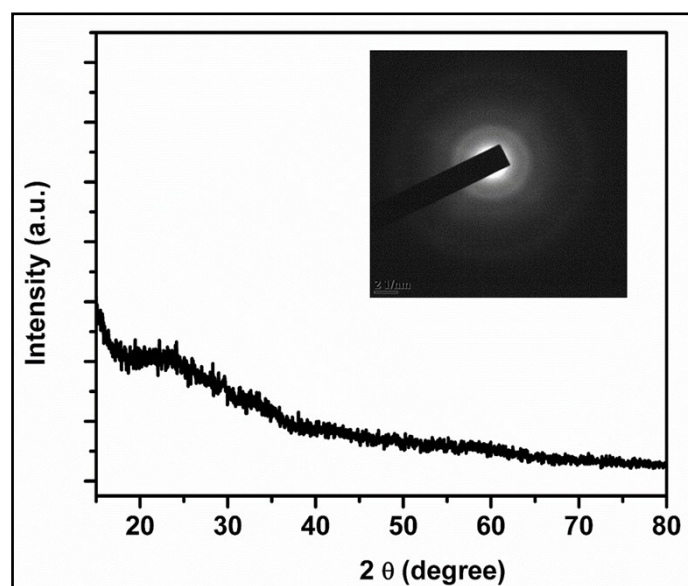


Figure S1. XRD of the as-deposited film on glass substrate (in inset the SAED obtained from TEM for the same).

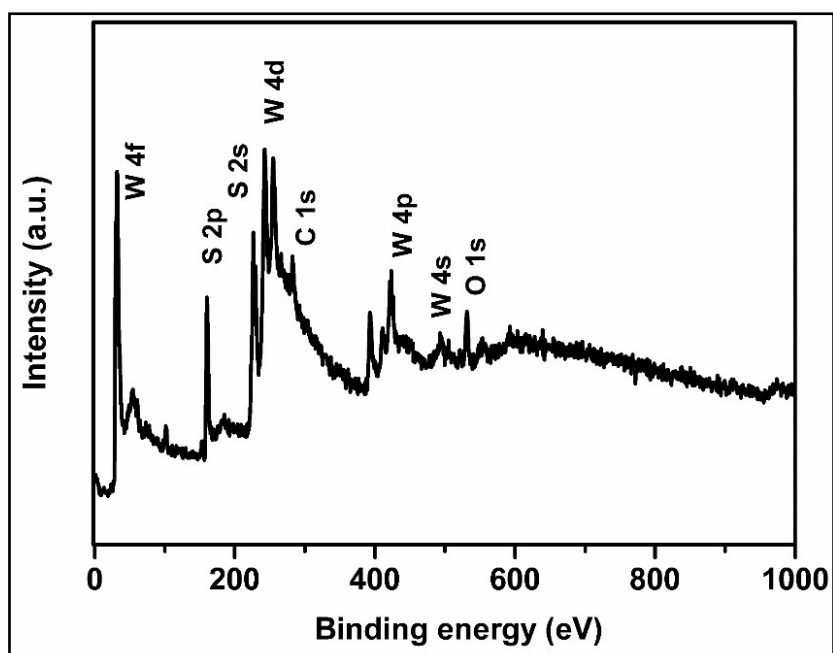


Figure S2. XPS survey of the film in a binding energy range of 0-1000 eV.

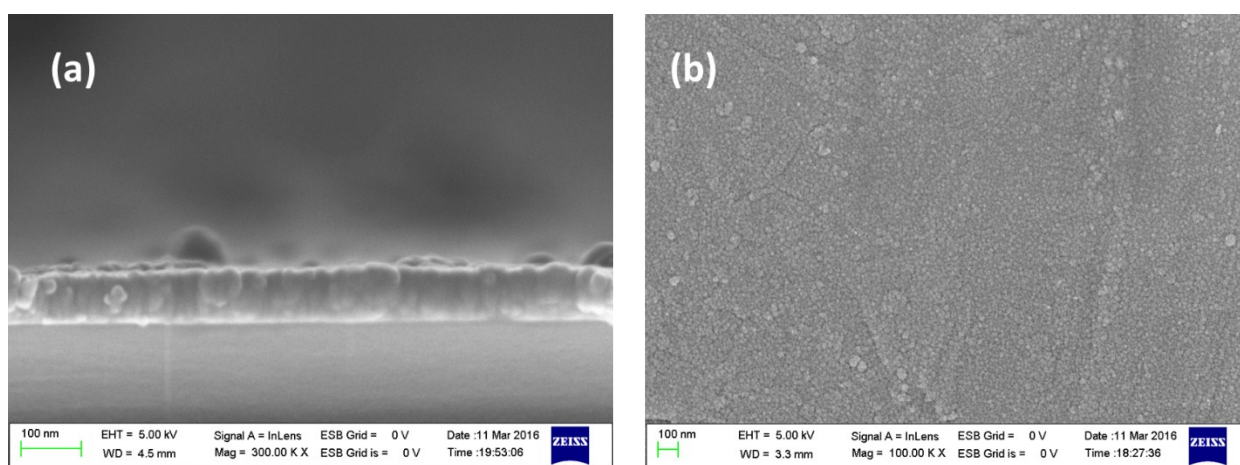


Figure S3. (a) Cross-section and (b) surface SEM image of the ALD grown WS_2 film used as an anode in Li-ion battery.

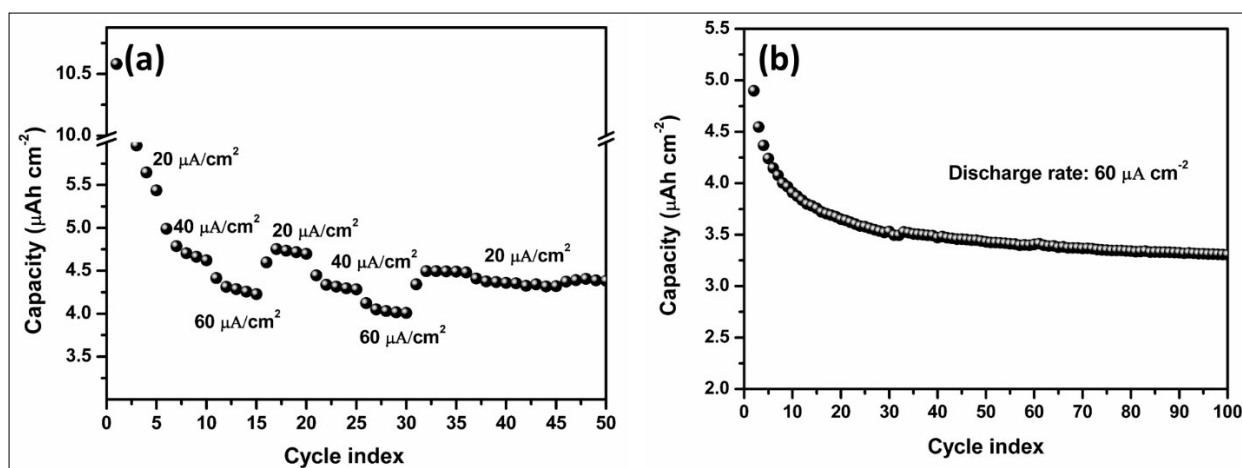


Figure S4. (a) The rate performance of the WS_2 anode with three different current densities 20, 40 and 60 $\mu\text{A cm}^{-2}$ under a potential window of 1-2.5V and (b) discharge capacity for 100 cycles showing the stability of the ALD grown anode at a higher discharge rate of 60 $\mu\text{A cm}^{-2}$ within the same potential window.

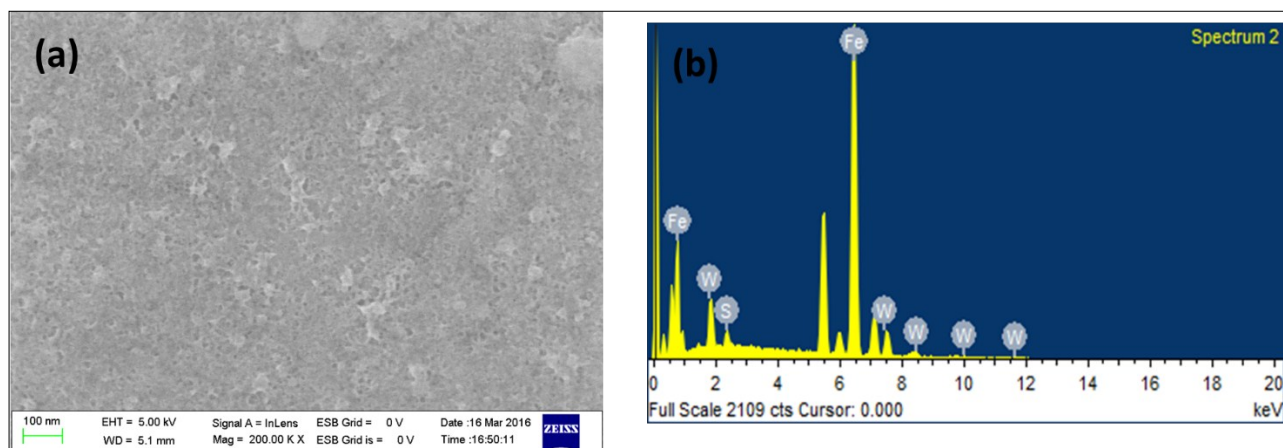


Figure S5. (a) Surface SEM image of WS_2 anode after cycling performance and (b) its corresponding EDX spectra confirming the presence both W and S in the film.

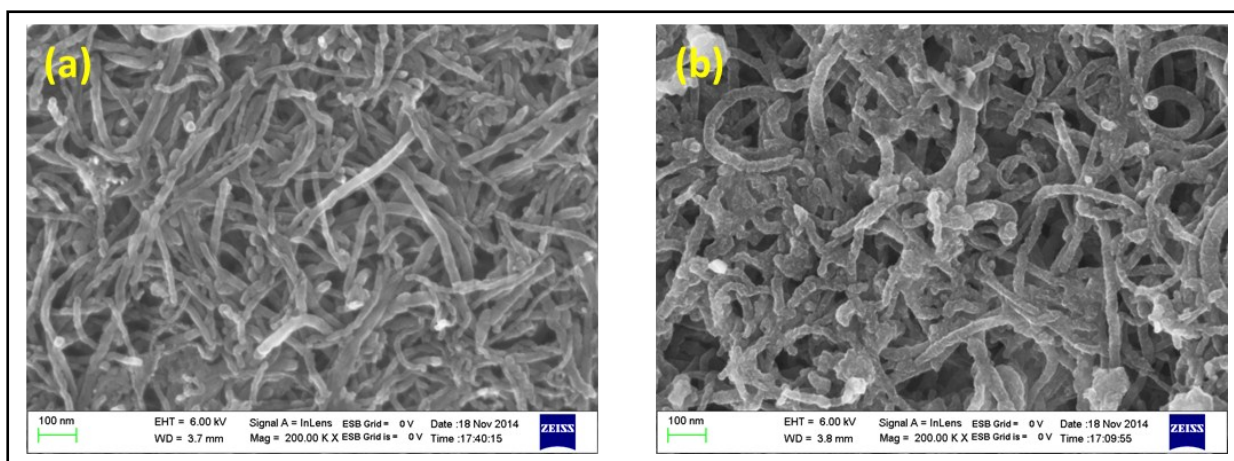


Figure S6: SEM images of the bare MWCNT and WS₂ coated MWCNT on SS substrates.

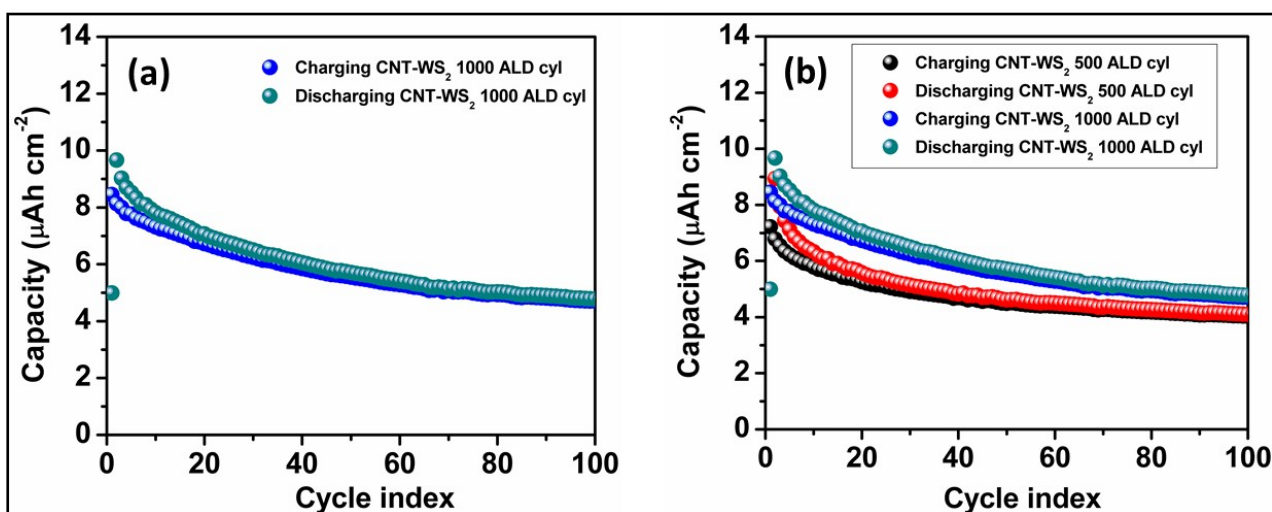


Figure S7. Charge-discharge capacities with cycle index of the film of (a) the as-grown WS₂ film grown on MWCNT for 1000 ALD cycles and (b) two films with different ALD cycles against Li/Li⁺ in a voltage range of 1-2.5 V at a current rate of 20 $\mu\text{A/cm}^2$.