Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary information

Scalable production of transition metal disulphide/graphite nanoflake composites for high-performance lithium storage

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Fig. S1. Digital image of a MoS_2 nanoflakes/DMF solution (10 mg mL^{-1}) after the ball milling and short-time sonication processes.

Fig. S2. Digital image of a WS_2 nanoflakes/DMF solution (10 mg mL^{-1}) after the ball milling and short-time sonication processes.

Fig. S3. Digital image of a graphite nanoflakes/DMF solution (10 mg mL^{-1}) after the ball milling and short-time sonication processes.

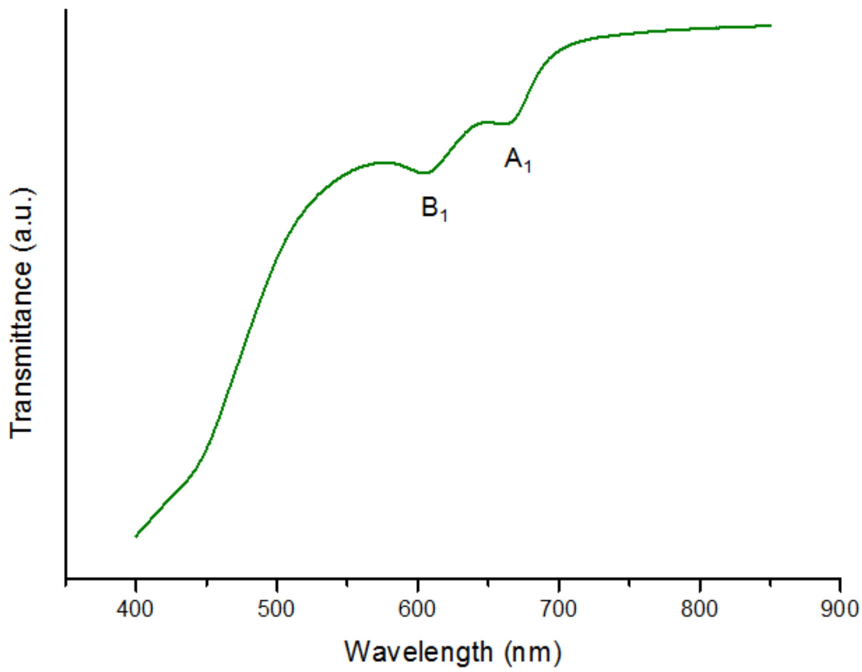


Fig. S4. UV/vis spectrum of a MoS_2 nanoflakes/DMF solution. The spectrum has two characteristic peaks at 674 and 622 nm, respectively, which represent the successful exfoliation of MoS_2 nanoflakes in DMF.

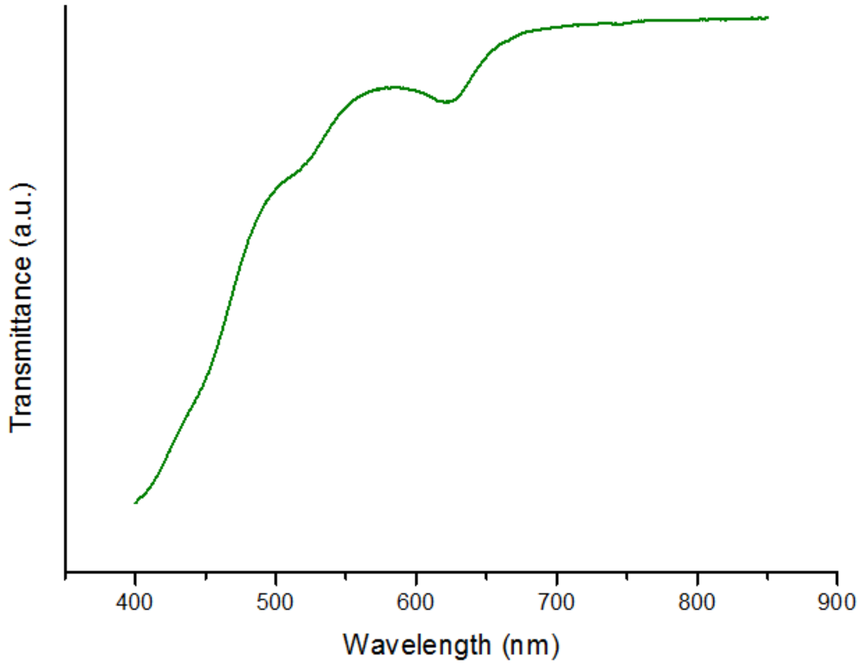


Fig. S5. UV/vis spectrum of a WS_2 nanoflakes/DMF solution. The spectrum has one characteristic peak at 621 nm, which represents the successful exfoliation of WS_2 nanoflakes in DMF.

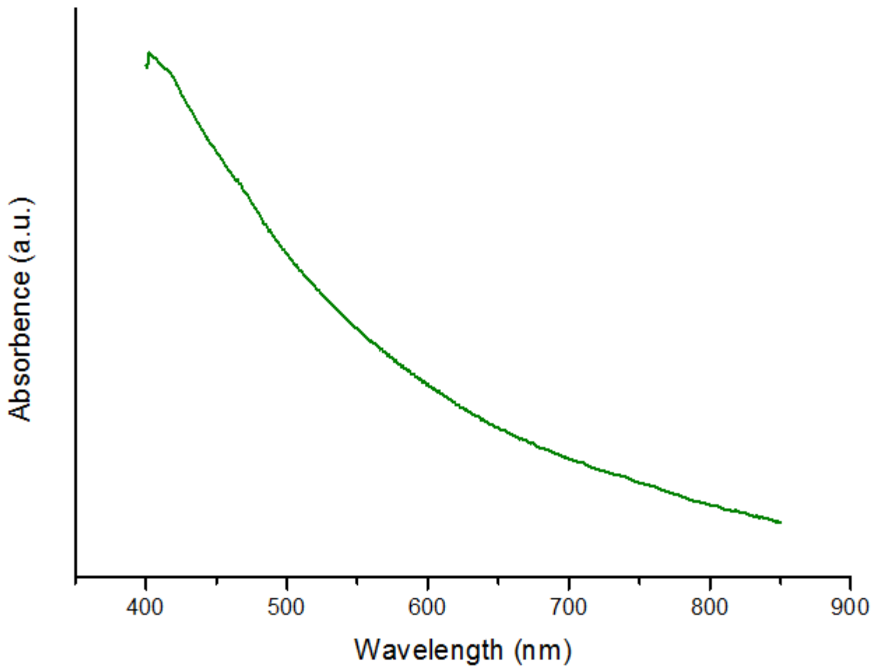


Fig. S6. UV/vis spectrum of a graphite nanoflakes/DMF solution. Note that the UV/vis spectrum is featureless within this wavelength range.

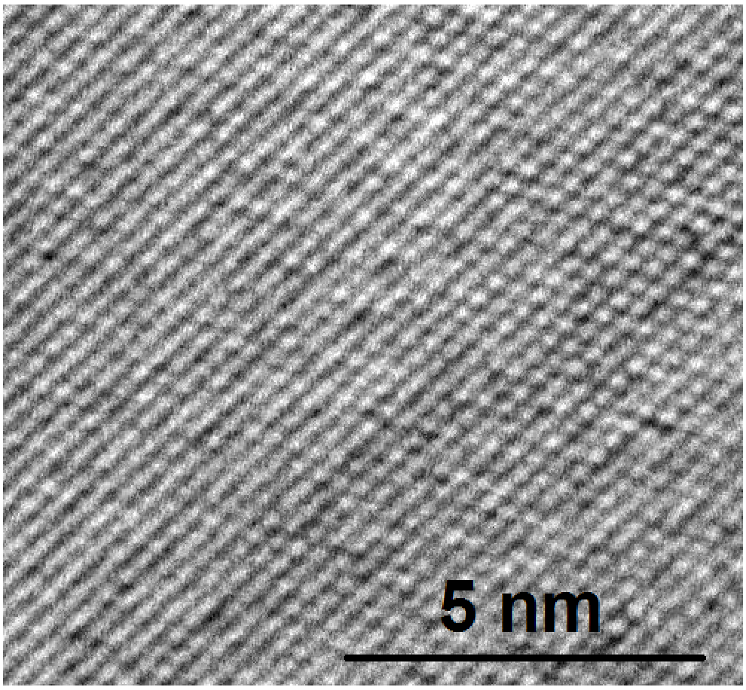


Fig. S7. Atomically resolved HRTEM image of a MoS_2 nanoflake showing a high degree of hexagonal symmetry.

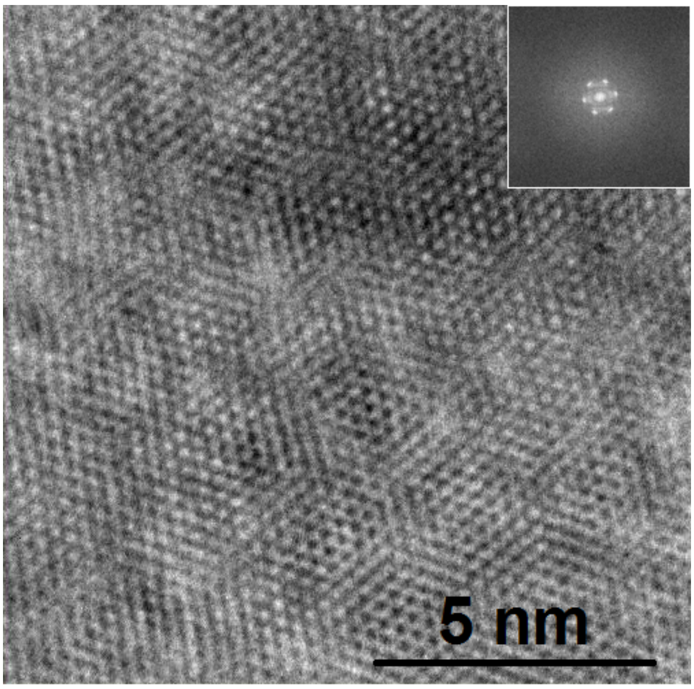


Fig. S8. Atomically resolved HRTEM image of a WS_2 nanoflake showing a high degree of hexagonal symmetry.

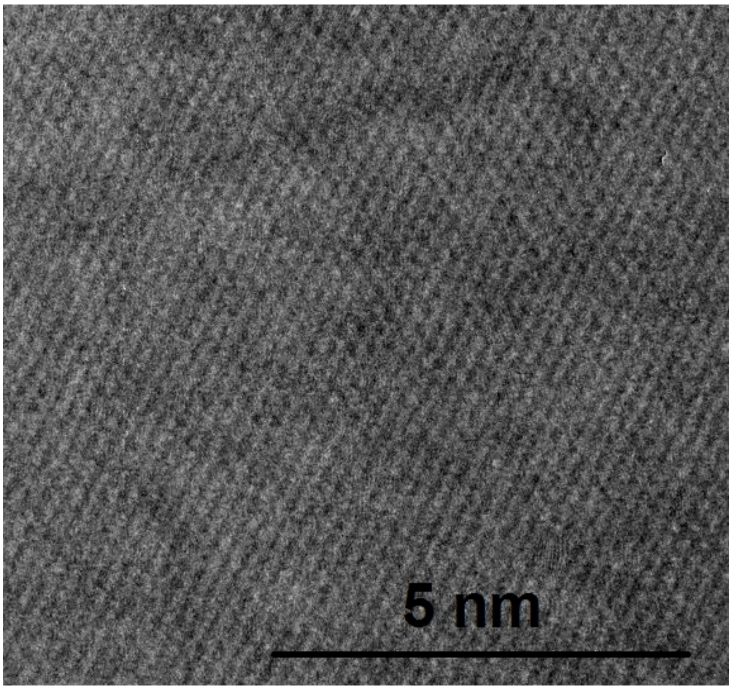


Fig. S9. Atomically resolved HRTEM image of a graphite nanoflake showing a high degree of hexagonal symmetry.

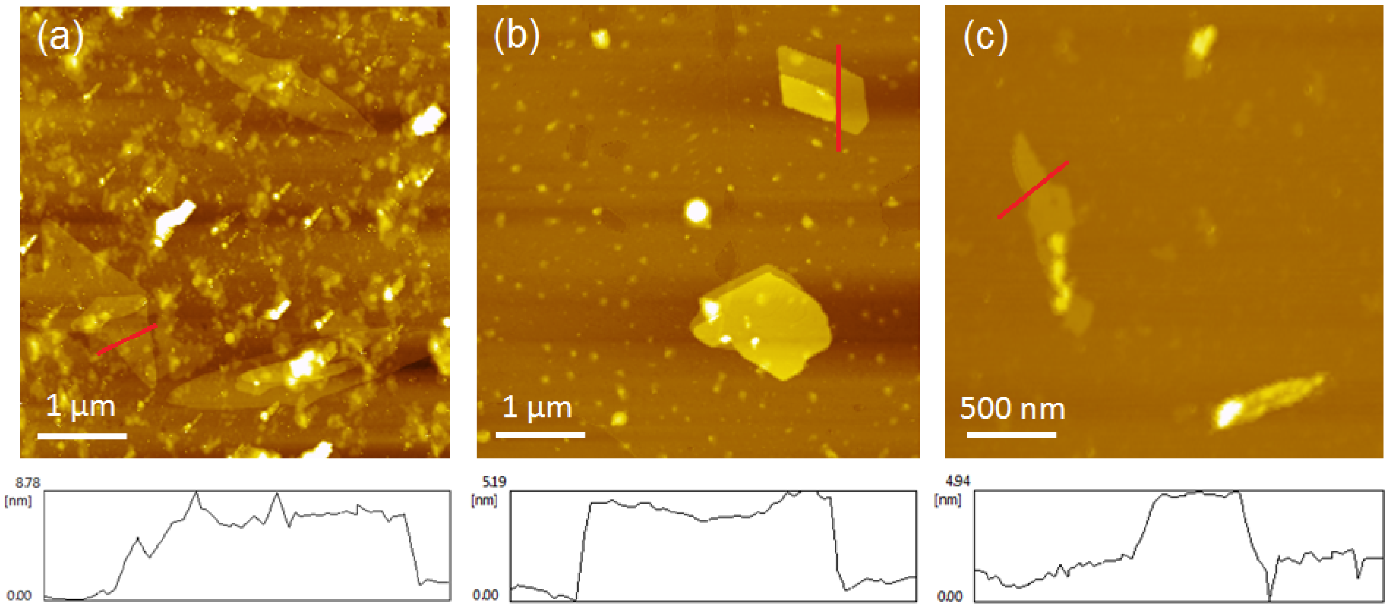


Fig. S10. SPM images of (a) graphite, (b) MoS_2 and (c) WS_2 nanoflakes and the height profiles corresponding to the red lines.

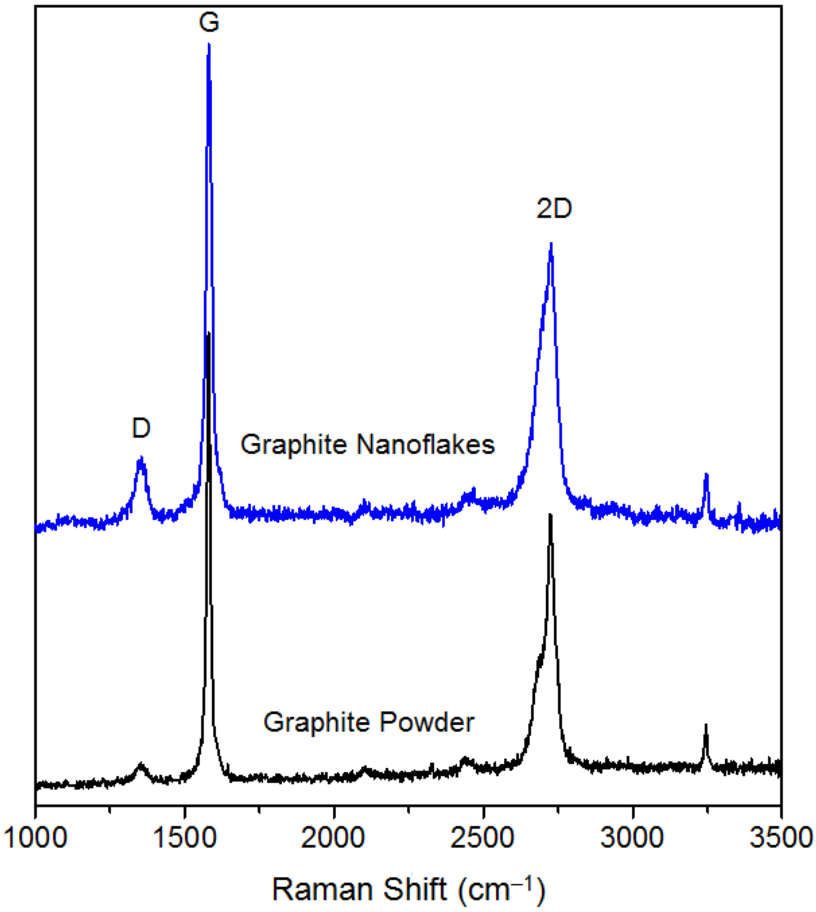


Fig. S11. Raman spectra of graphite powder and graphite nanoflakes.

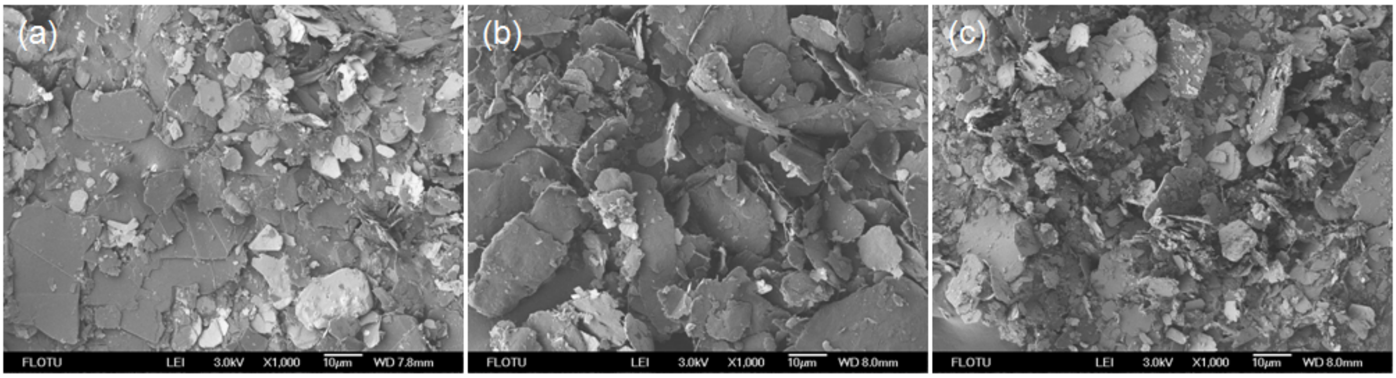


Fig. S12. SEM images of (a) graphite, (b) MoS_2 and (c) WS_2 nanoflakes.

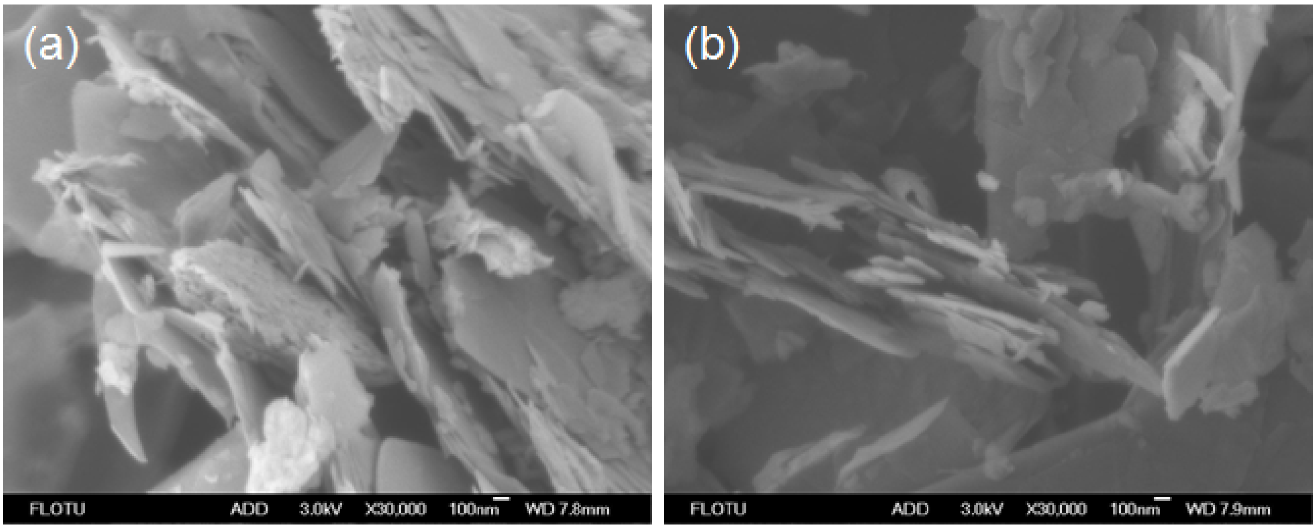


Fig. S13. High-magnification SEM images of (a) MoS_2/graphite and (b) WS_2/graphite nanoflake composites at a wt ratio of 50/50.

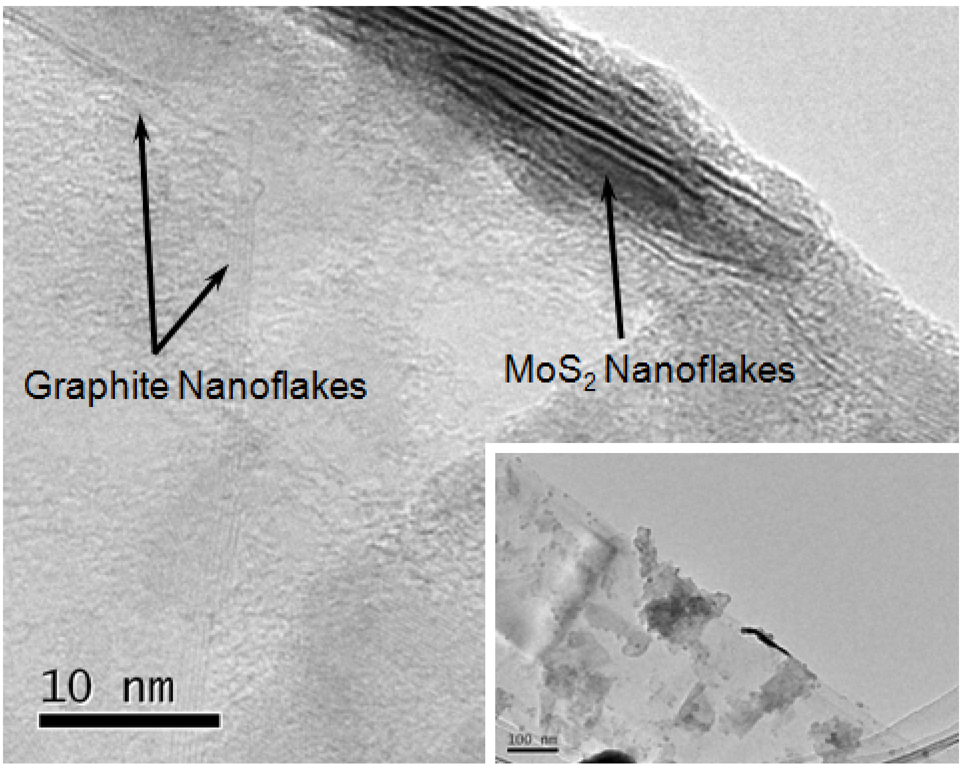


Fig. S14. HRTEM image of MoS_2/graphite nanoflake composite at a wt ratio of 50/50. The insert is the corresponding low-magnification TEM image. In the HRTEM image we can see that the MoS_2 and graphite nanoflakes are mixed uniformly, and their edges can be clearly distinguished.

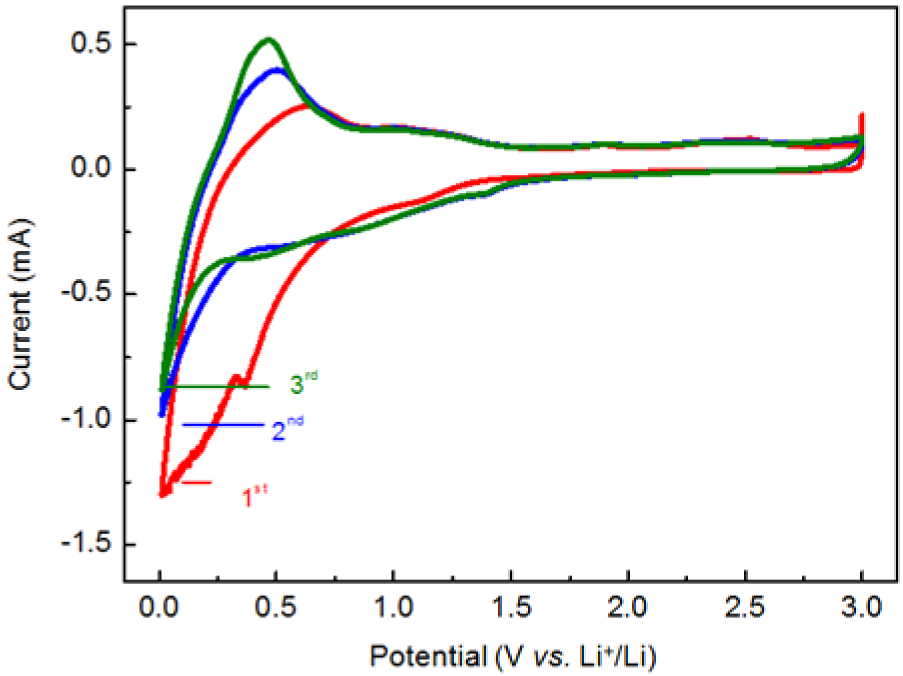


Fig. S15. CV (scan rate = 0.1 mV s^{-1}) curves of graphite nanoflakes.

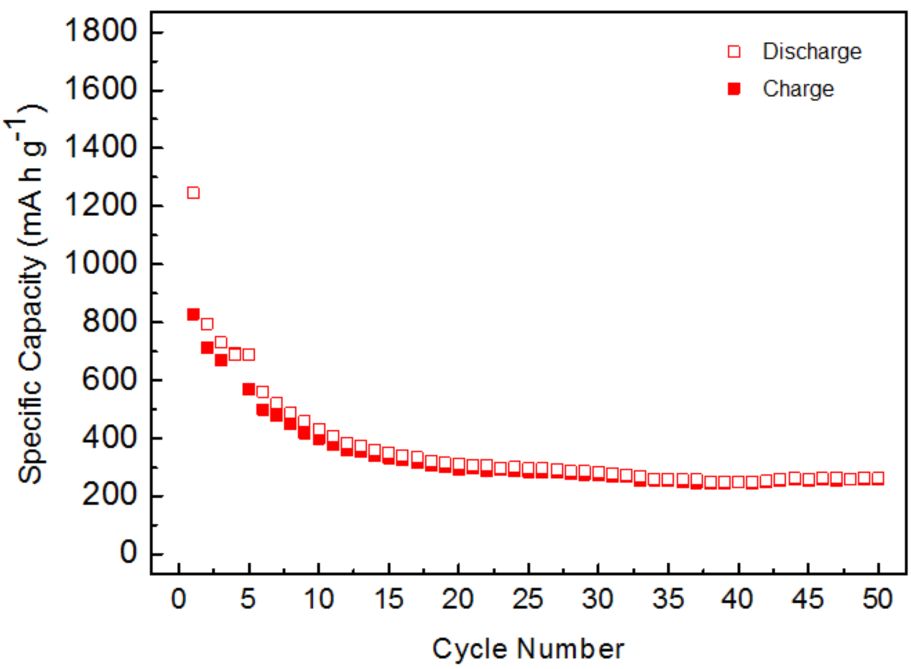
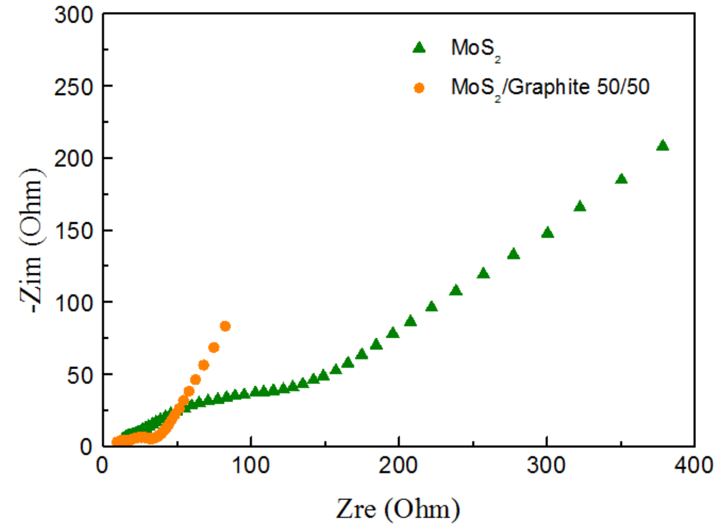
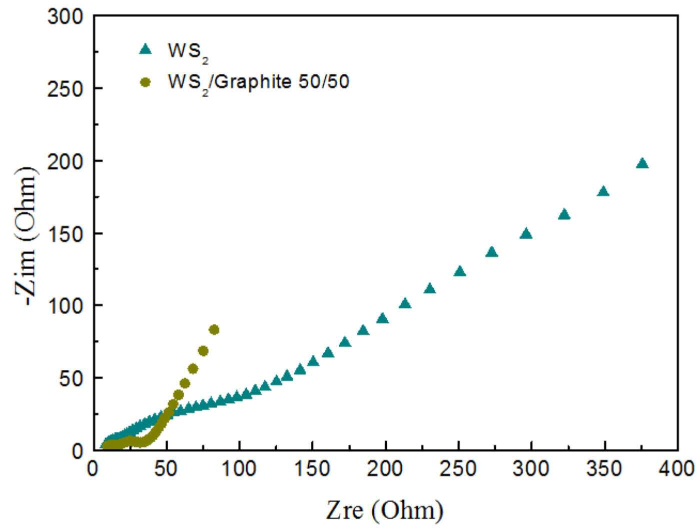


Fig. S16. Cycle behaviour (current density = 100 mA g^{-1}) of graphite nanoflakes.



Electrode	R_Ω (Ω)	R_f (Ω)	R_{ct} (Ω)
MoS_2/Graphite 50/50	7.0	9.7	15.5
MoS_2 Nanoflakes	9.0	16.5	57.1

Fig. S17. Nyquist plots of MoS_2 nanoflakes and MoS_2/graphite nanoflake composites at a wt ratio of 50/50.



Electrode	R_Ω (Ω)	R_f (Ω)	R_{ct} (Ω)
WS_2/Graphite 50/50	8.1	18.1	13.6
MoS_2 Nanoflakes	12.6	20.2	109.2

Fig. S18. Nyquist plots of WS_2 nanoflakes and WS_2/graphite nanoflake composites at a wt ratio of 50/50.