Electronic Supplementary Information

Development of a novel method to grow MoS_2 mono/few-layer films and MoS_2-graphene hybrid films for supercapacitor applications†

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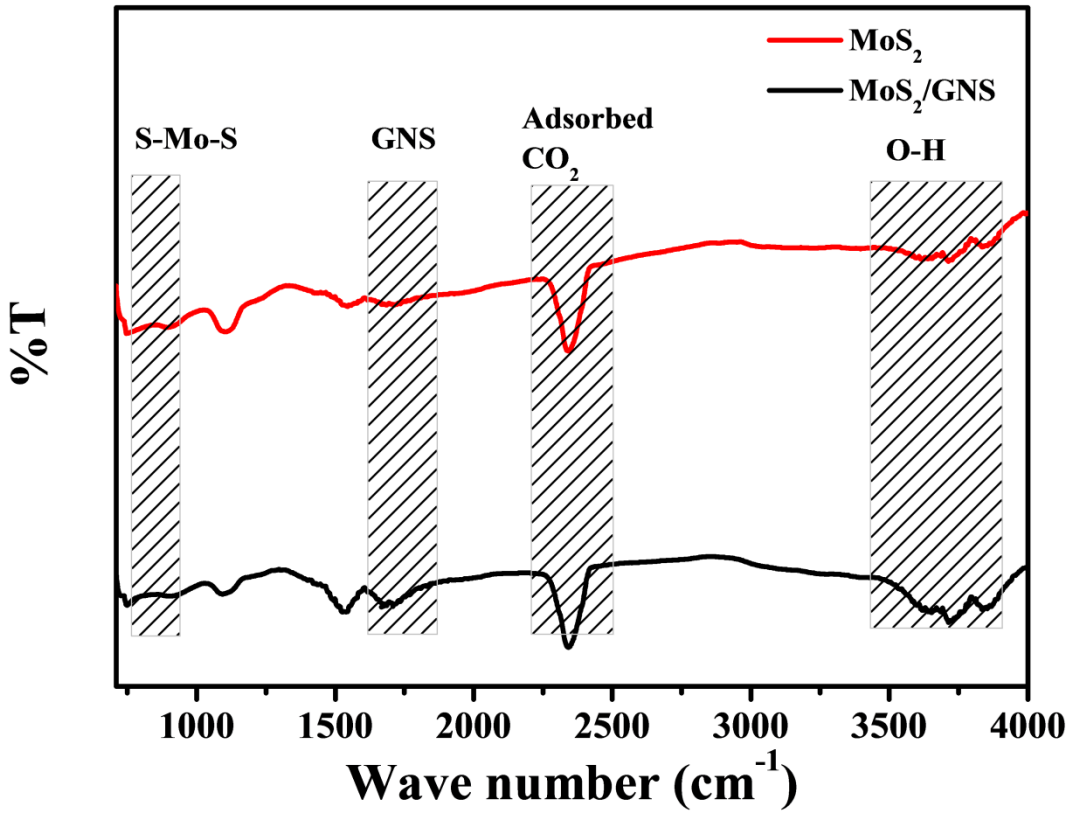

Fig. S1. Fourier transform infrared spectra of MoS_2 nanosheets and MoS_2 –GNS composites.

FT-IR spectra of MoS_2 –GNS composites were compared between 400 – 4000 cm^{-1}. As shown in Fig. S1, in the FT-IR spectra, the bands between 3400 to 3700 cm^{-1} are attributed to the oxygen containing functional groups of graphene.[1] The peak at 2260 cm^{-1} were caused by CO_2 absorbed in the sample.[2] Furthermore, the observed absorption band between "1620-1730 cm^{-1}" for MoS_2-GNS, indicates the skeletal vibration of graphene sheets.

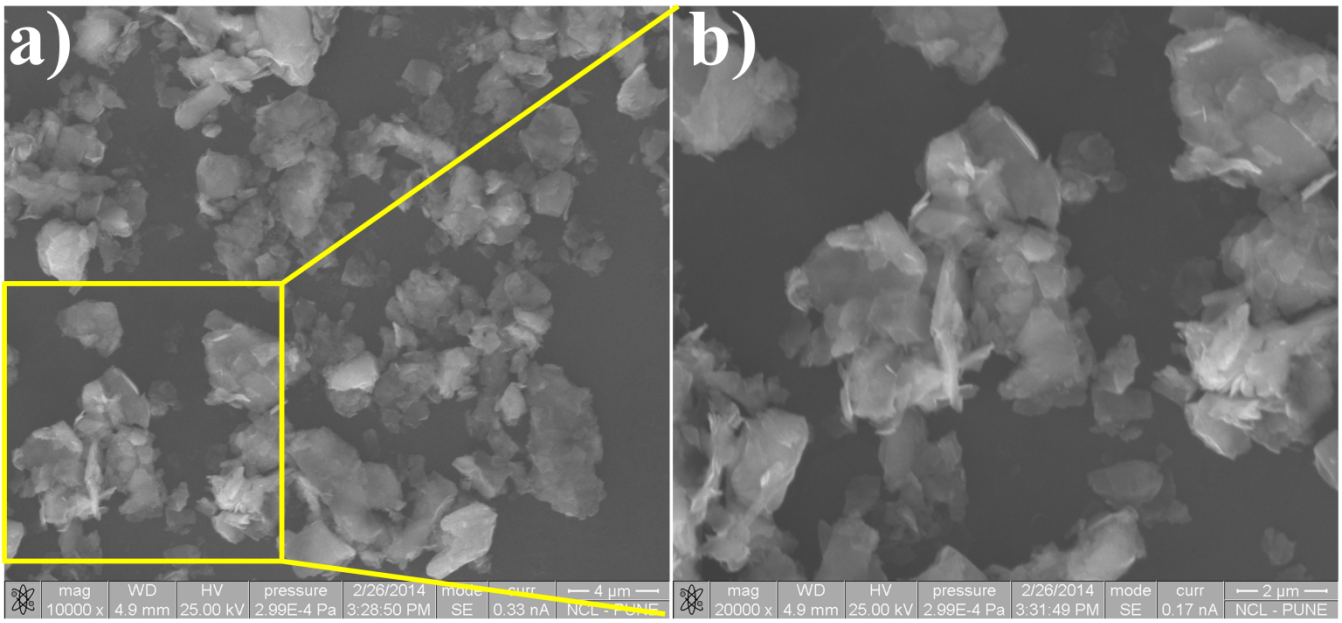

Fig. S2. SEM image of acid-intercalated exfoliated MoS_2 nanosheets deposited on Si wafer.

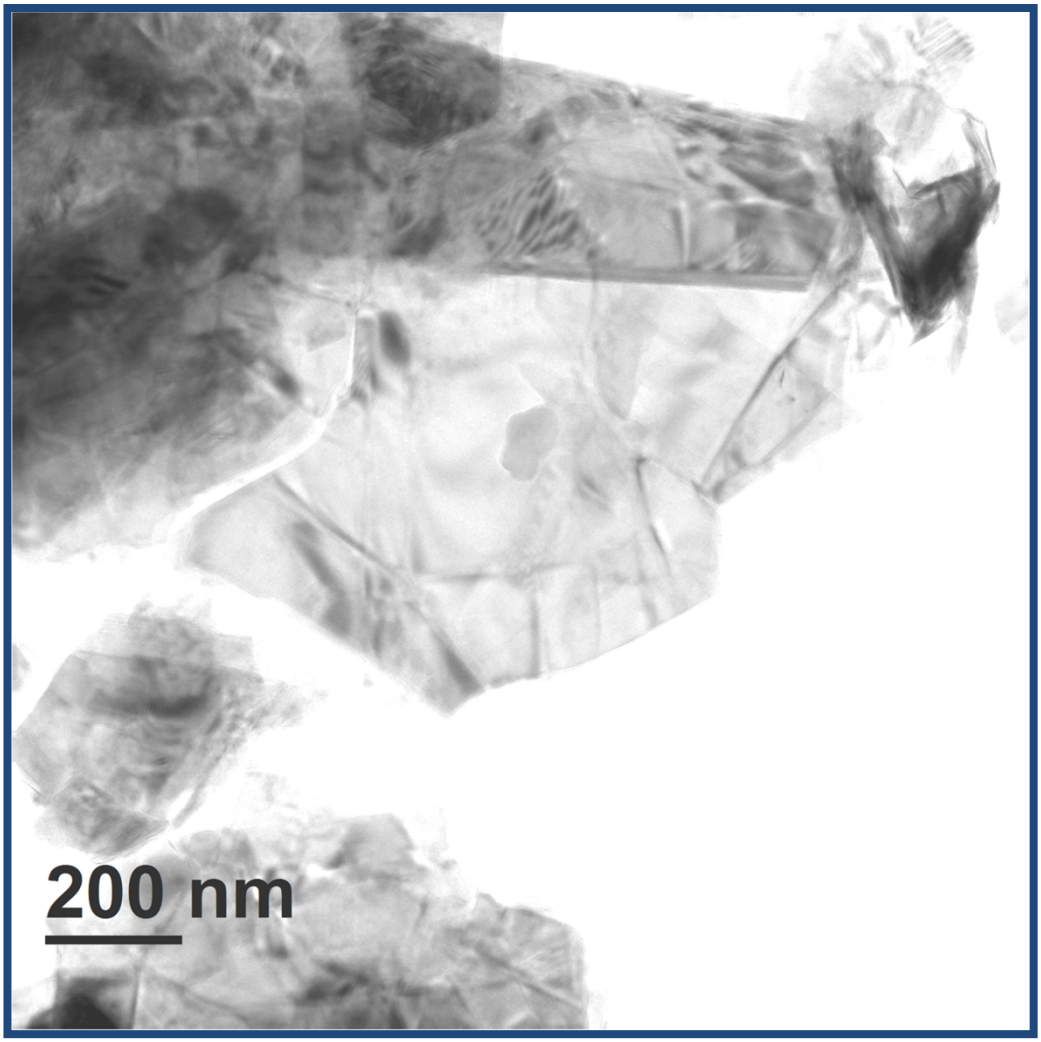

Fig. S3. HRTEM of MoS_2 image display the curved graphene like morphology at low magnification.

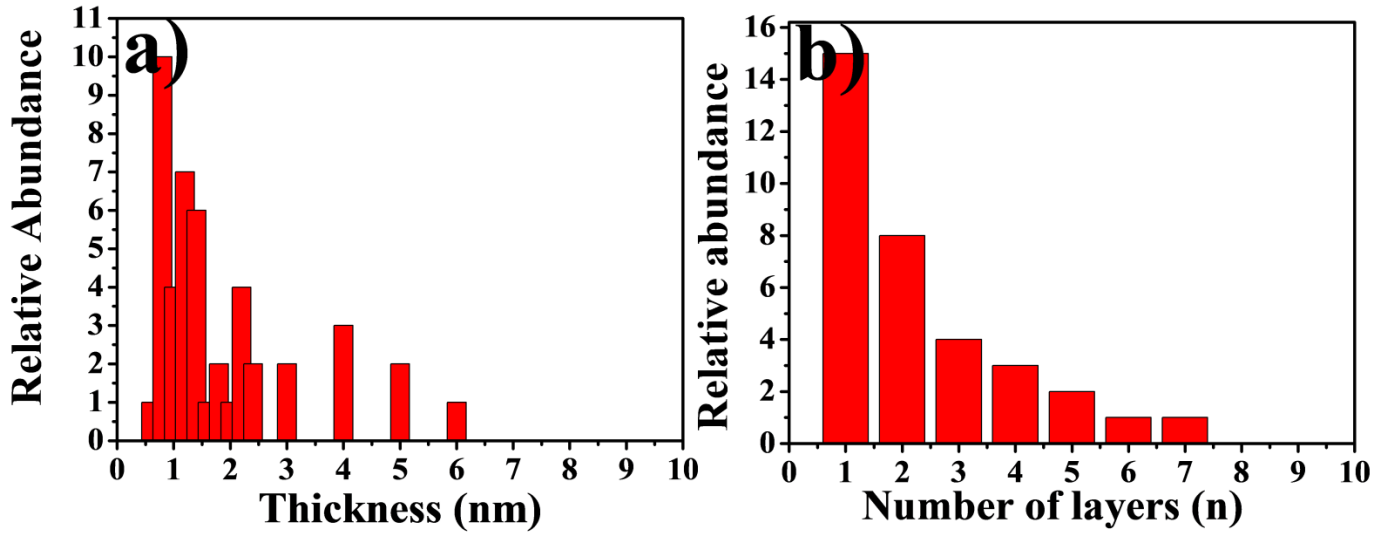

Fig. S4. Thickness distribution based on 50 randomly selected 2D nanosheets of MoS_2 in the AFM topographic image, Fig. 4a.

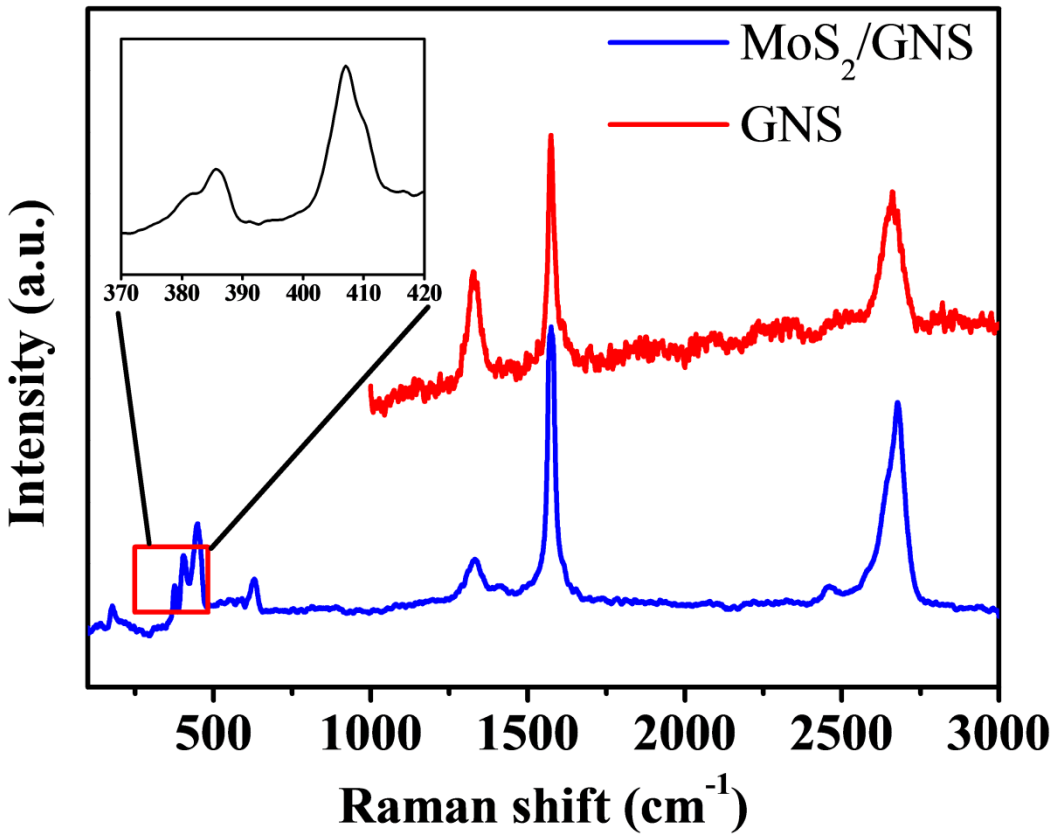

Fig. S5 Raman spectra of GNS and MoS_2 –GNS composite

Table S1:

	Specific capacitance Fg^{-1} from Cyclic Voltametry				% Retention
Scan Rate	20mVs-1	50 mVs-1	100 mVs-1	150 mVs-1	
MoS_2	155	153	124	108	69%
MoS_2/GNS	282	169	152	141	85%

Table S2:

	Specific capacitance Fg^{-1} from Galvanostatic charge discharge				% Retention
Current Density	20 µA	40 µA	60 µA	80 µA	
MoS_2	156	152	147	144	92.3%
MoS_2/GNS	255	243	240	236	92.5%

References

1. K.-J. Huang, L. Wang, Y.-J. Liu, Y.-M. Liu, H.-B. Wang, T. Gan and L.-L. Wang, *J of Hydrogen Energy*, 2013, **38**, 14027.
2. G. Huang, T. Chen, W. Chen, Z. Wang, K. Chang, L. Ma, F. Huang, D. Chen and Y. Lee, *Small*, 2013, **9**, 3693.