Electronic Supplementary Material (ESI) for Nanoscale.

Supporting information for

Few-layers MoS_2 anchored Graphene Aerogel Paper for Free-Standing Electrode Materials

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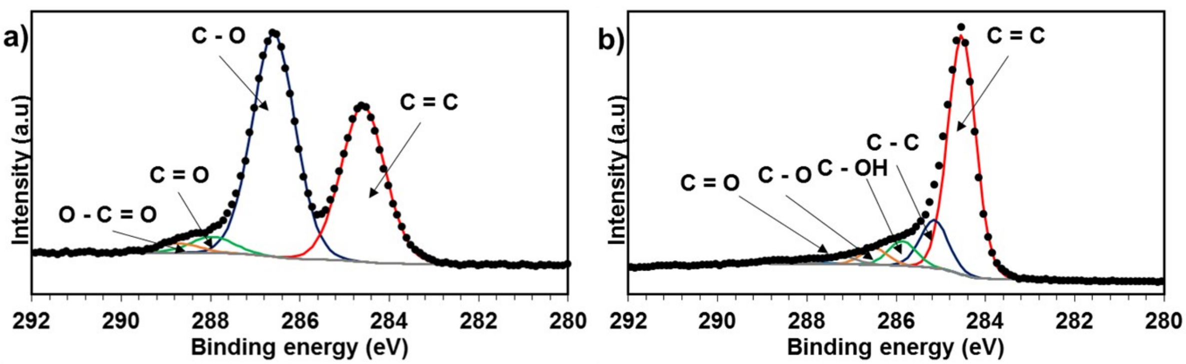

Figure S1 High resolution C 1s XPS of a) pristine graphene oxide (obtained directly from freeze-dried), and b) MGAP

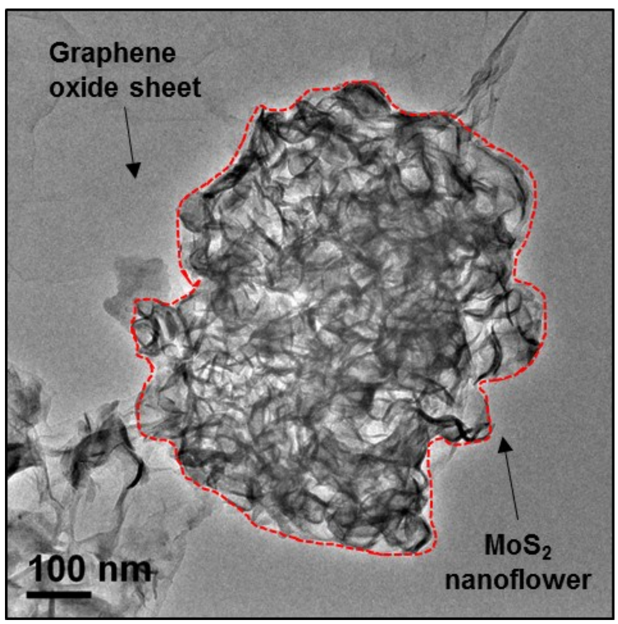

Figure S2 Survey TEM of MGAP

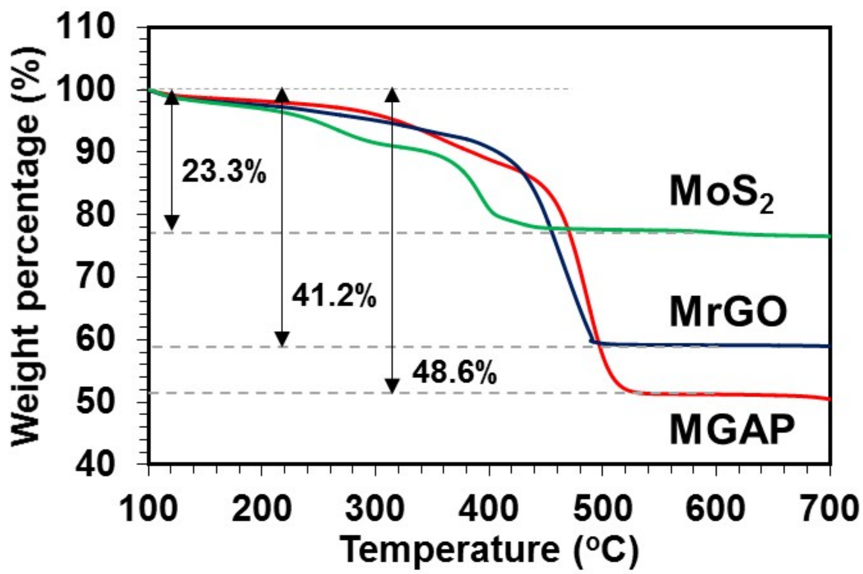

Figure S3 TGA analysis of pristine MoS_2, MrGO, and MGAP (10 °C min^{-1} to 700 °C under O_2 environment)

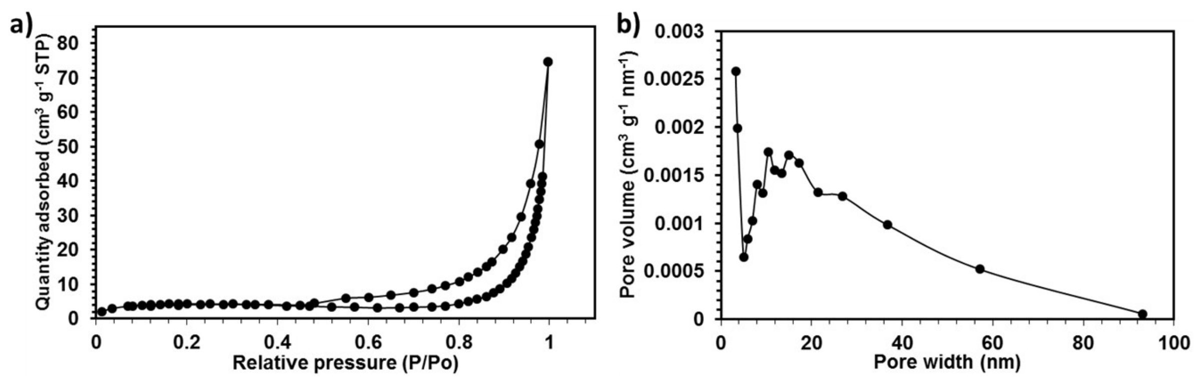

Figure S4 a) BET N_2 adsorption/desorption isotherm curve for MGAP, and b) pore size distribution of MGAP

MGAP has a surface area of *ca.* 5.5 m^2 g^{-1} based on the BET result. Figure S4a shows the N_2 adsorption/desorption isotherm curve for MGAP, and it portrays a type IV hysteresis loop which is indicative of the presence of mesopores in sample. The pore distribution as shown in Figure S4b reveals a large pore size distribution of MGAP, which majority are in the mesopores range. The low BET surface area of MGAP is due to the increase in density of the aerogel (mechanical compression, and addition of MoS_2, 48 wt %) [S1], and the fusion of mesopores to form macropores due to the gradual growth of ice crystals during freeze-drying [S2].

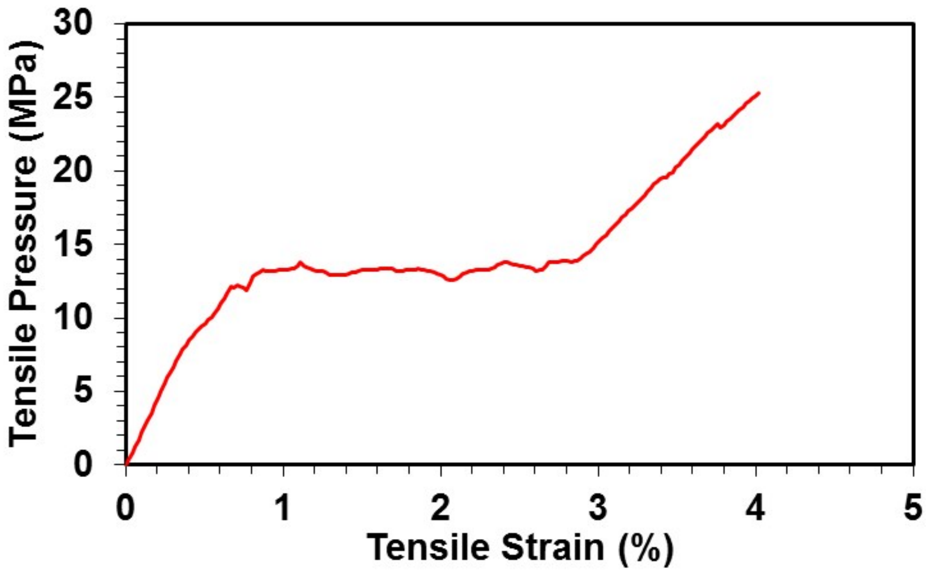

Figure S5 Tensile stress-strain behavior of MGAP

Tensile test was performed on MGAP using Instron 5548 micro tester. The sample displayed a plateau at tensile pressure of 13 MPa, which was later increased to an ultimate tensile pressure of 25 MPa. Such phenomenon may be due to the multi-layered structure of the fabricated sample. During the plateau, the various graphene oxide layers started to fail while continuing its elongation. Finally at tensile strain of 3 %, the pressure increased to fracture the remaining graphene oxide layers.

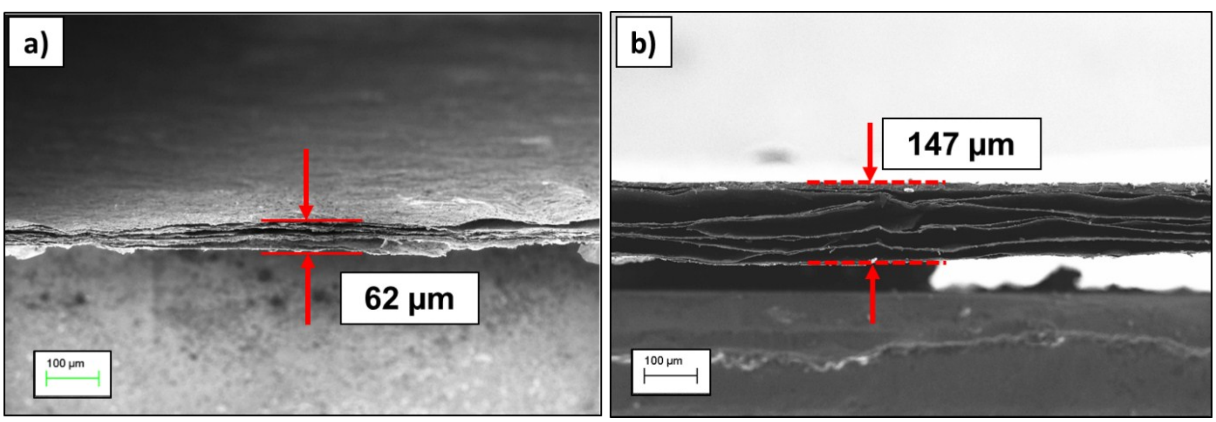

Figure S6 SEM images of MGAP with thickness a) 67 µm, and b) 147 µm

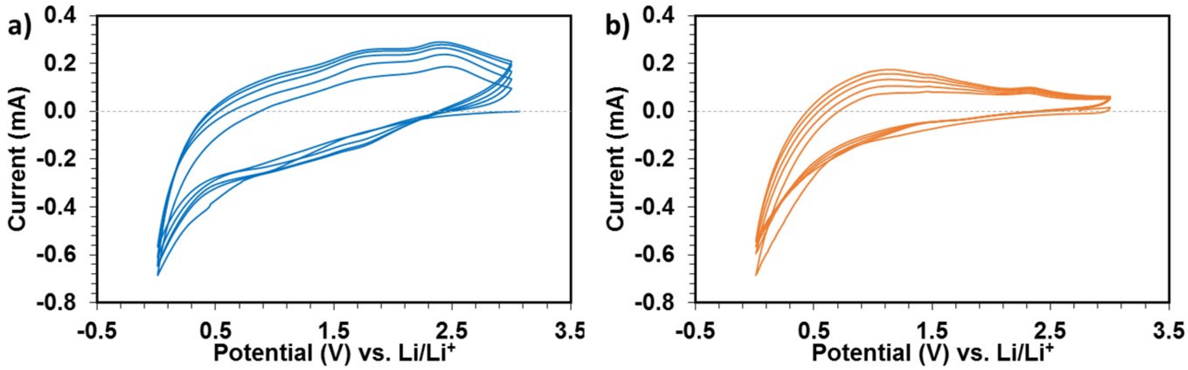

Figure S7 First 5 CV curves of MGAP with thickness a) 67 μm, and b) 147 μm

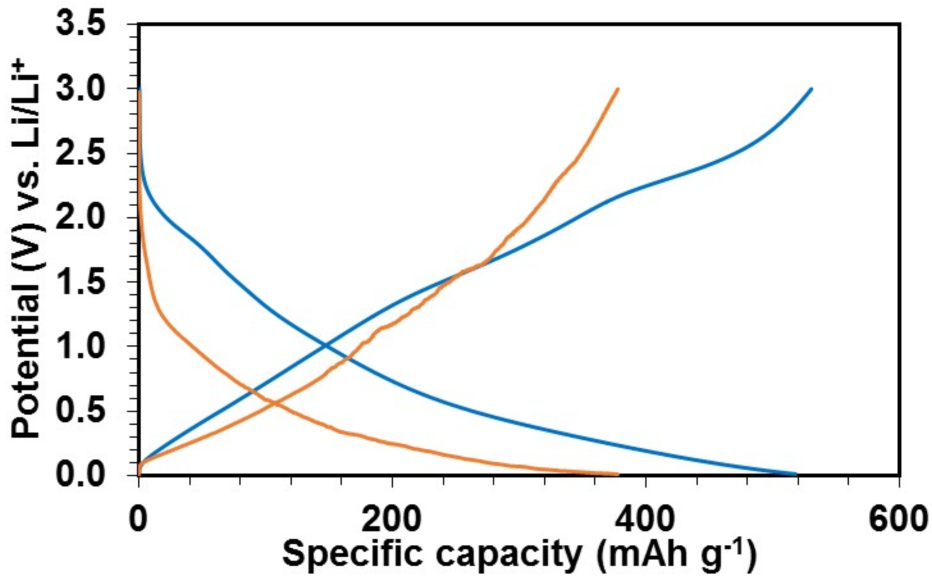

Figure S8 Galvanostatic charge/discharge profiles of MGAP with thickness 67 μm (blue), and 147 μm (orange)

References

[S1] Zhong-Shuai Wu, Shubin Yang, Yi Sun, Khaled Parvez, Xinliang Feng, and Klaus Müllen, *J. Am. Chem. Soc.*, 2012, 134, 9082

[S2] Xuetong Zhang, Zhuyin Sui, Bin Xu, Shufang Yue, Yunjun Luo, Wanchu Zhan, and Bin Liu, *J. Mater. Chem.*, 2011, 21, 6494