

## Supplementary Data

# Nanocubes of Mo<sub>6</sub>S<sub>8</sub> Chevrel Phase as Active Electrode Material for Aqueous Lithium-Ion Batteries

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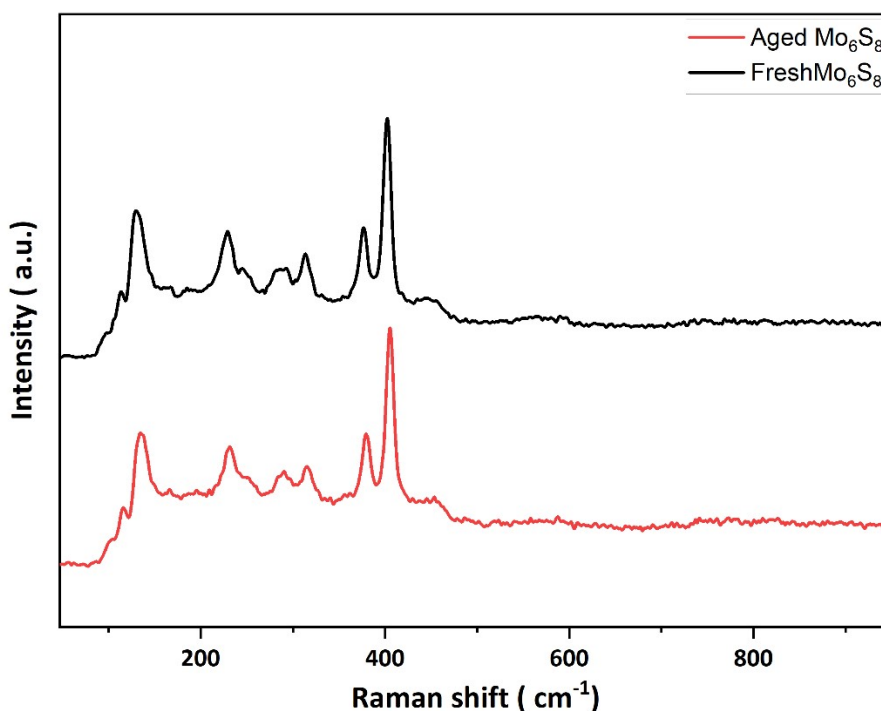
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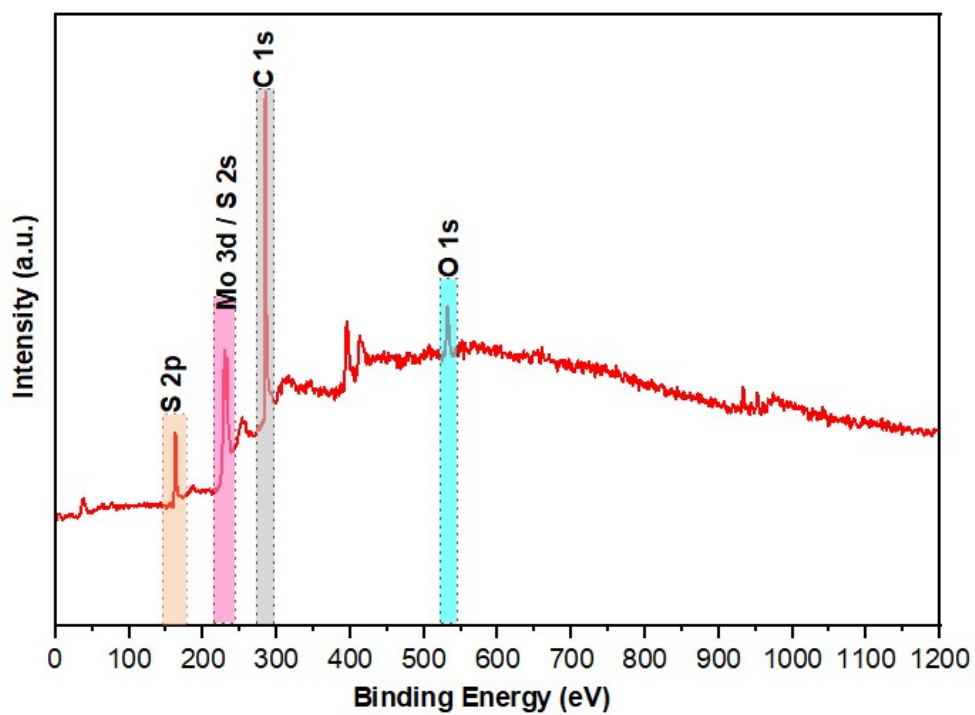
- **The technical and experimental details of the ICP-MS protocol used are described right below:**

The ICP method is based on British Standards Document BS EN ISO 17294-1 for Trace Metals in waters, using a PerkinElmer NexION 350D ICP-MS. This method uses a 5-point linear calibration with a 99.999% minimum regression, with an internal standard to correct for instrument drift and matrix interferences.

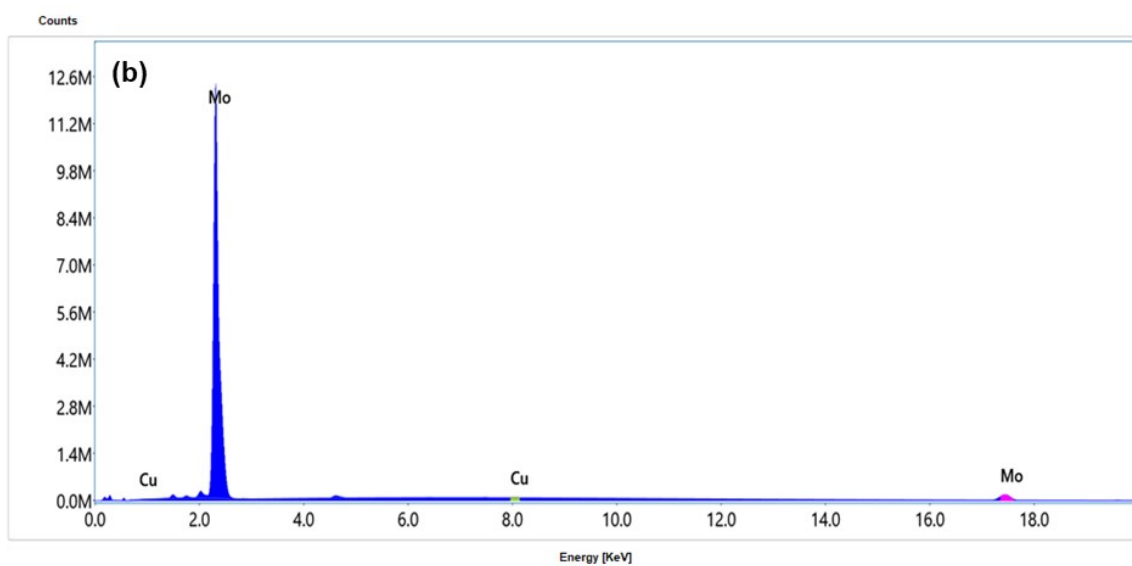
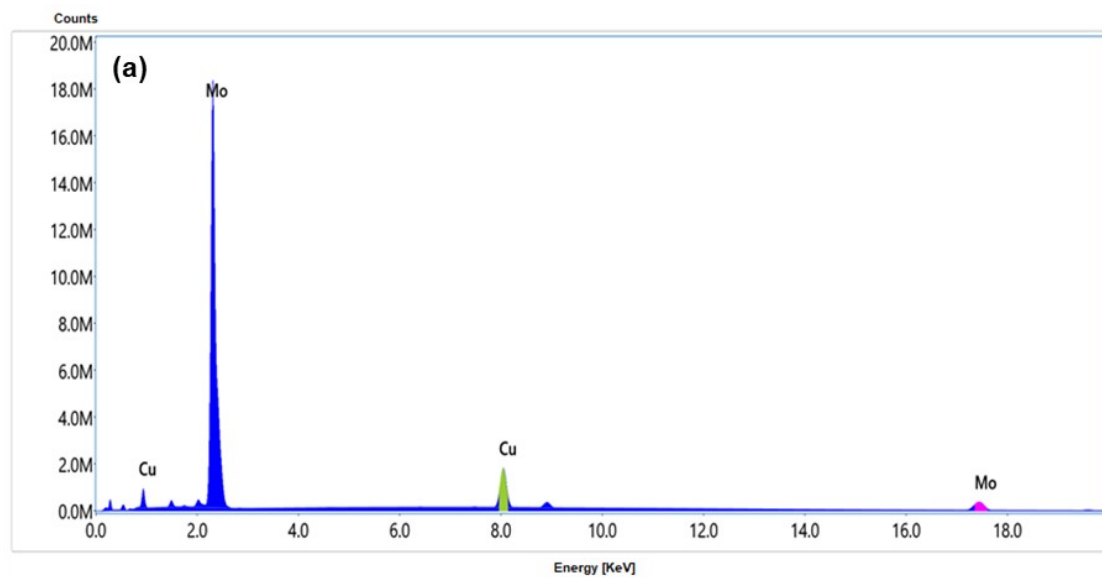
Results are quantified against this curve in mg/L, or ppm, at a limit of detection of 5 ppb, any figures below this should be noted as being below the limit of detection (<LOD); including any quantities below zero, as the instrument below these levels cannot discern peaks from background noise. Each sample is measured three times, and an average of these replicates is calculated by the instrument. The %RSD variance between each replicate is less than 2.5%.



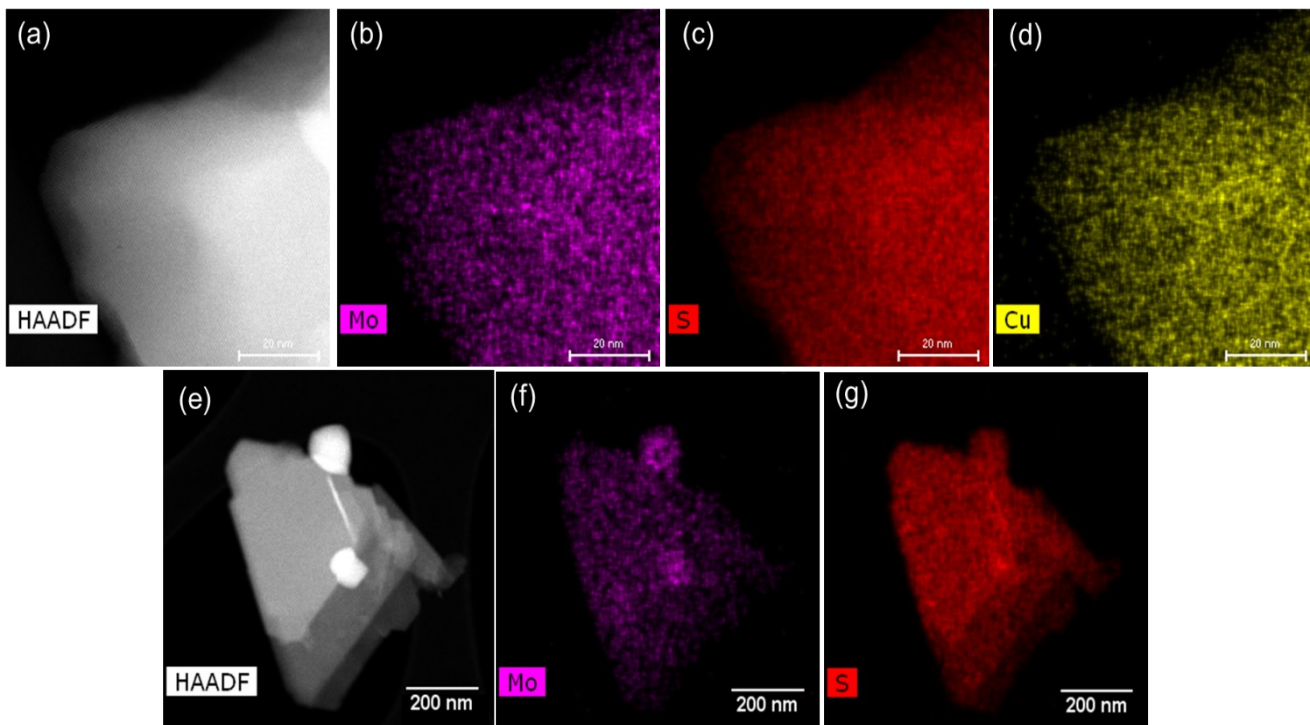
**Fig. S1.** Comparison of the Raman spectrum of the aged and fresh leached Mo<sub>6</sub>S<sub>8</sub>



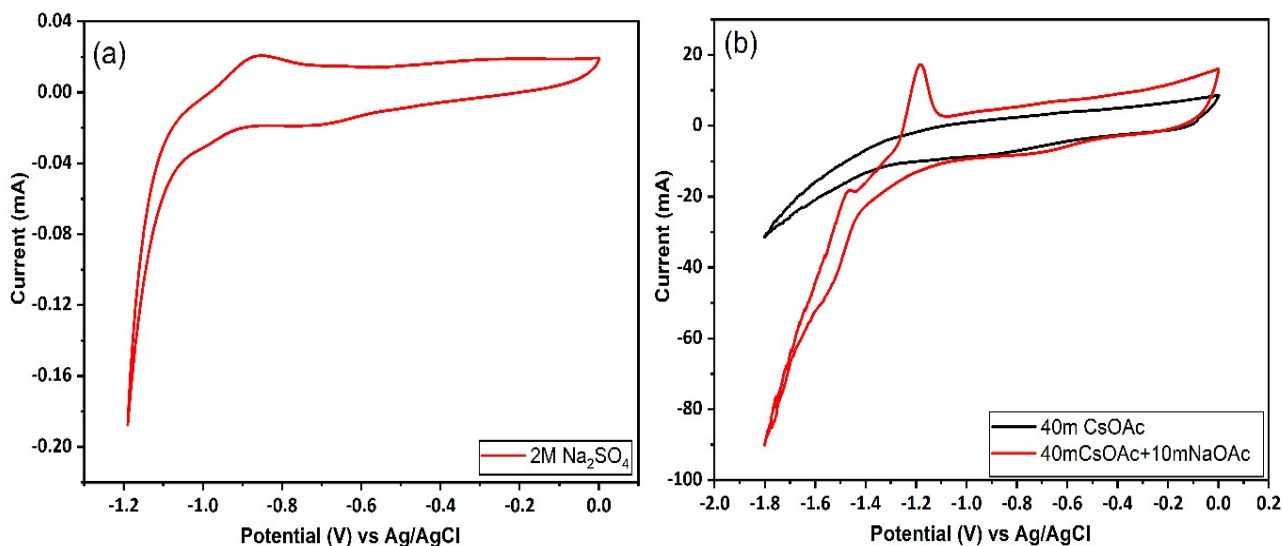
**Fig. S2.** The survey spectrum of the  $\text{Mo}_6\text{S}_8$ , contains the expected elements of Mo and S with carbon and oxygen, typical of atmosphere exposed surfaces, in agreement with the EDX spectrum.



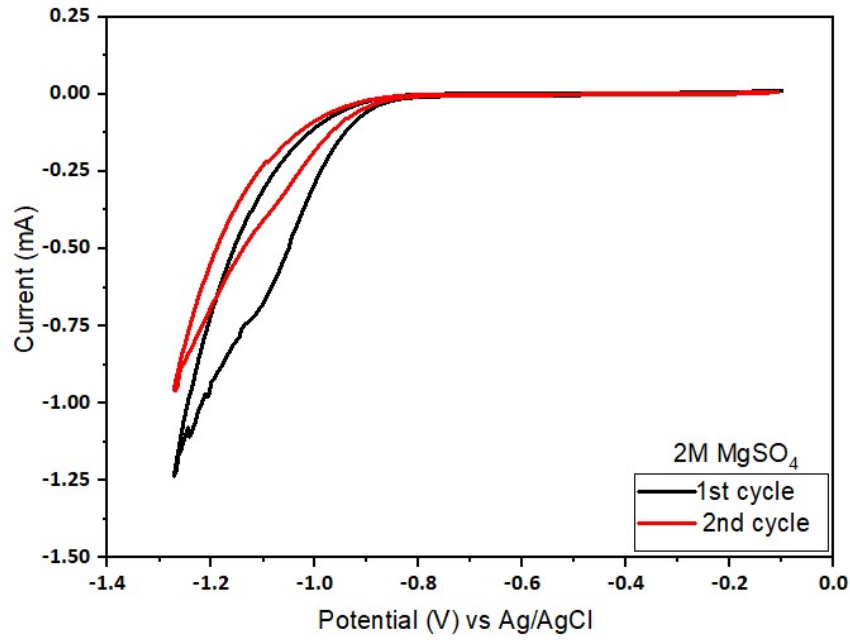
**Fig. S3.** SEM EDX spectrainages of the as-prepared  $\text{Cu}_2\text{Mo}_6\text{S}_8$  and  $\text{Mo}_6\text{S}_8$ .  $\text{Cu}_2\text{Mo}_6\text{S}_8$  (a), and  $\text{Mo}_6\text{S}_8$  (b).



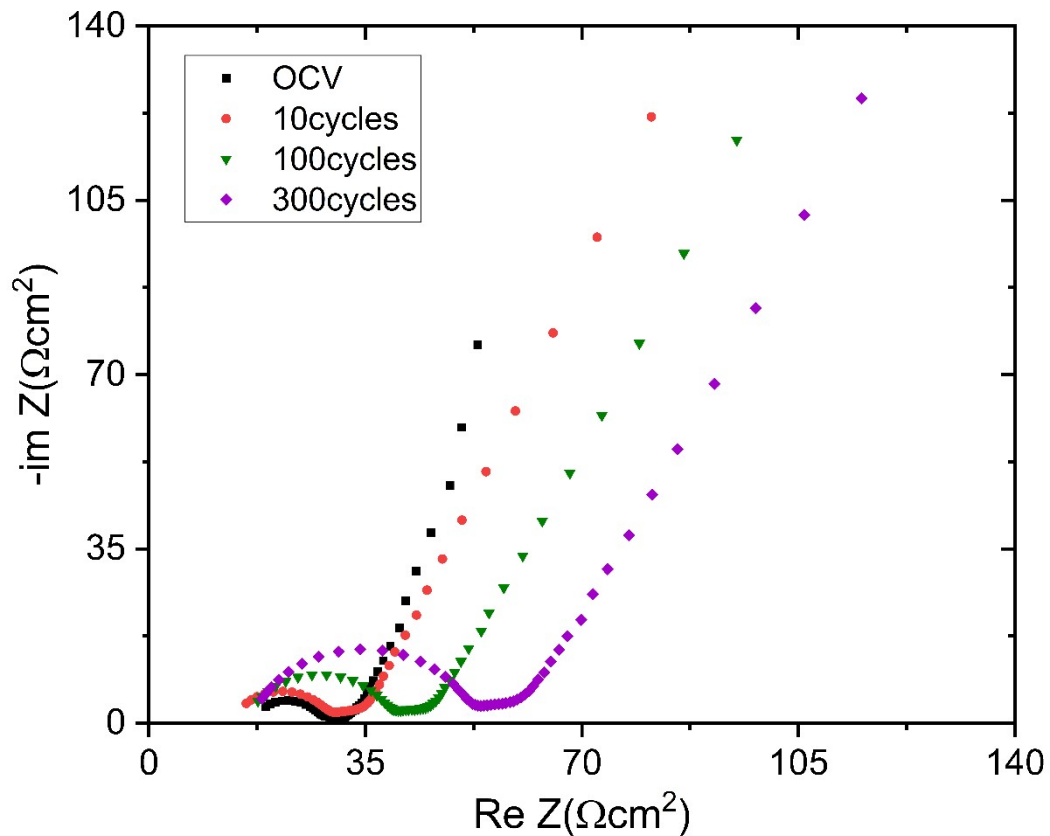
**Fig. S4.** HAADF-STEM image of the as-prepared  $\text{Cu}_2\text{Mo}_6\text{S}_8$  and  $\text{Mo}_6\text{S}_8$  and their corresponding STEM EDX elemental mapping.  $\text{Cu}_2\text{Mo}_6\text{S}_8$  (a-d), and  $\text{Mo}_6\text{S}_8$  (e-g). Mo (purple), S (red), and Cu (yellow).



**Fig. S5.** Cyclic voltammetry (CV) of  $\text{Mo}_6\text{S}_8$  electrode measured in different sodium electrolytes at a scan rate of 3 mV/s. In (b) comparison of the CV profiles with and without NaOAc, shows that the peak response is attributed to the  $\text{Na}^+$  intercalation and not  $\text{Cs}^+$  ions.



**Fig. S6.** Cyclic voltammetry of  $Mo_6S_8$  working electrode in 2M  $MgSO_4$  at 3 mV/s.



**Fig. S7.** Nyquist plots recorded at open circuit potential (OCP) (determined by monitoring the change in potential,  $E$ , with time,  $t$ , and considering a stable potential value for  $dE/dt < 1 \mu V$ ) during the galvanostatic charging/discharging of full cell in the frequency range from 10kHz to 1 mHz.