

Supplementary Information

Deciphering Solid Electrolyte Interface in Cellulose- Montmorillonite Nano-Composites for Sodium Batteries

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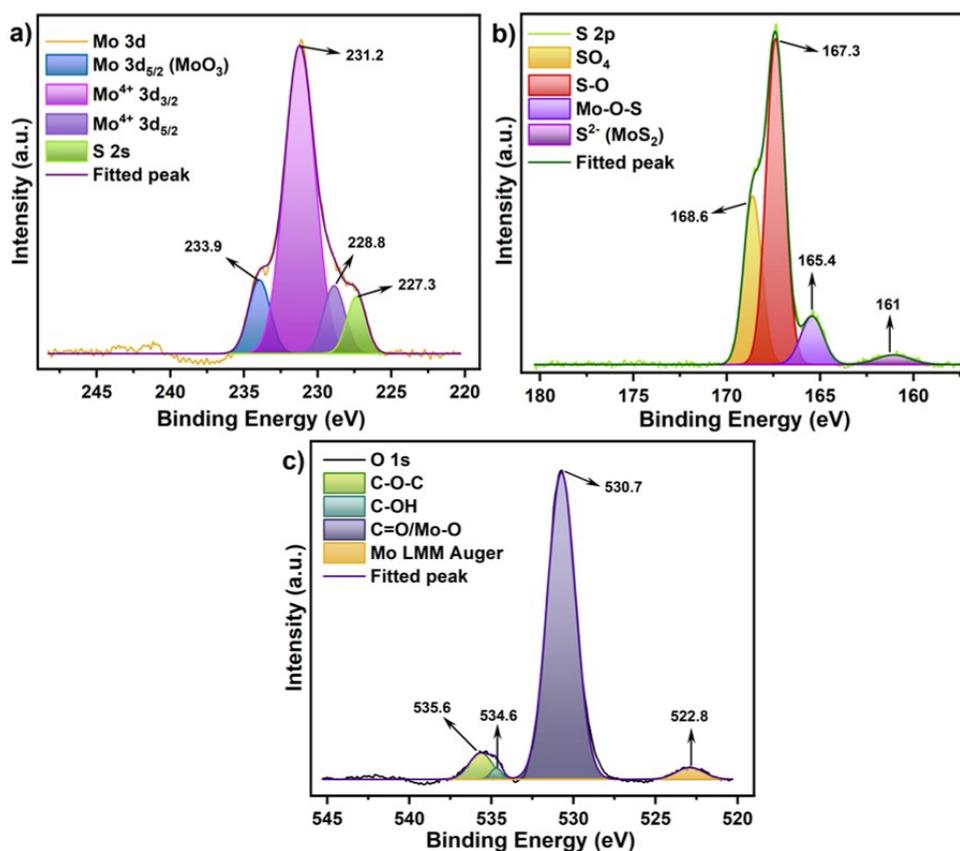


Figure S1: X-ray photoelectron spectra (XPS) of cycled MoS₂ (a) Mo 3d; (b) S 2p and (c) O 1s revealing the surface state changes post-cycling and interfacial reactions occurring at the interface.

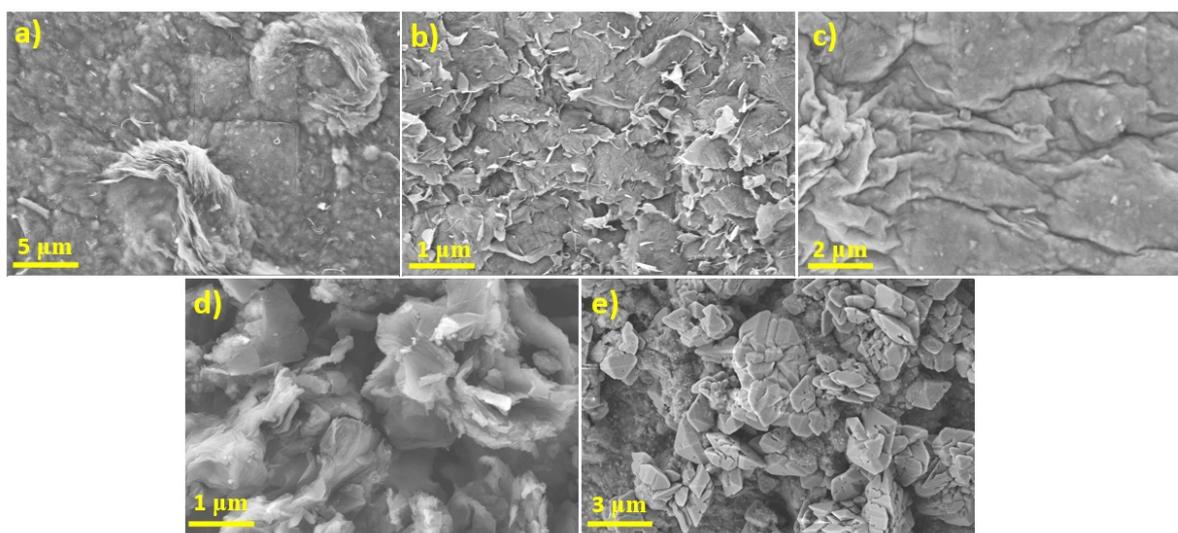


Figure S2: Scanning Electron Microscopic images (SEM) of (a) pristine 2.5C:1M (b) post cycling of 2.5C:1M symmetric Na|Na cell; (c) post cycling of 2.5C:1M with cycled cell; (d) pristine MoS₂; and (e) cycled MoS₂.

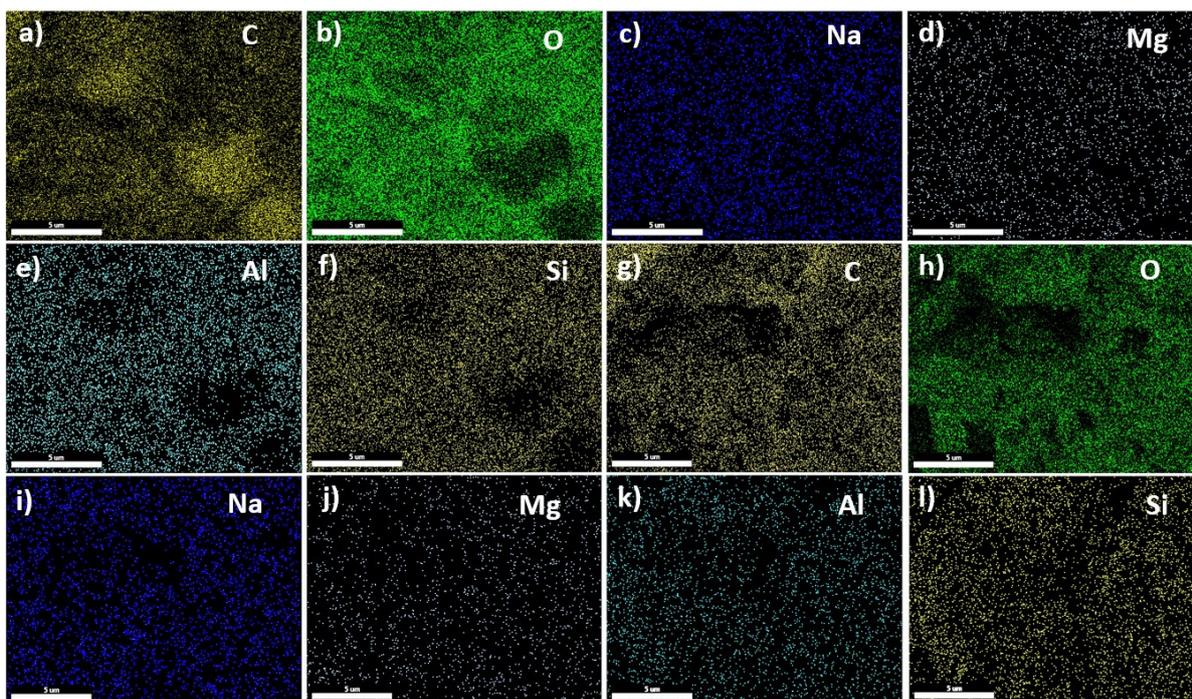


Figure S3: Energy Dispersive X-ray analysis of (a-f) cycled 2.5C:1M and (g-l) pristine 2.5C:1M.

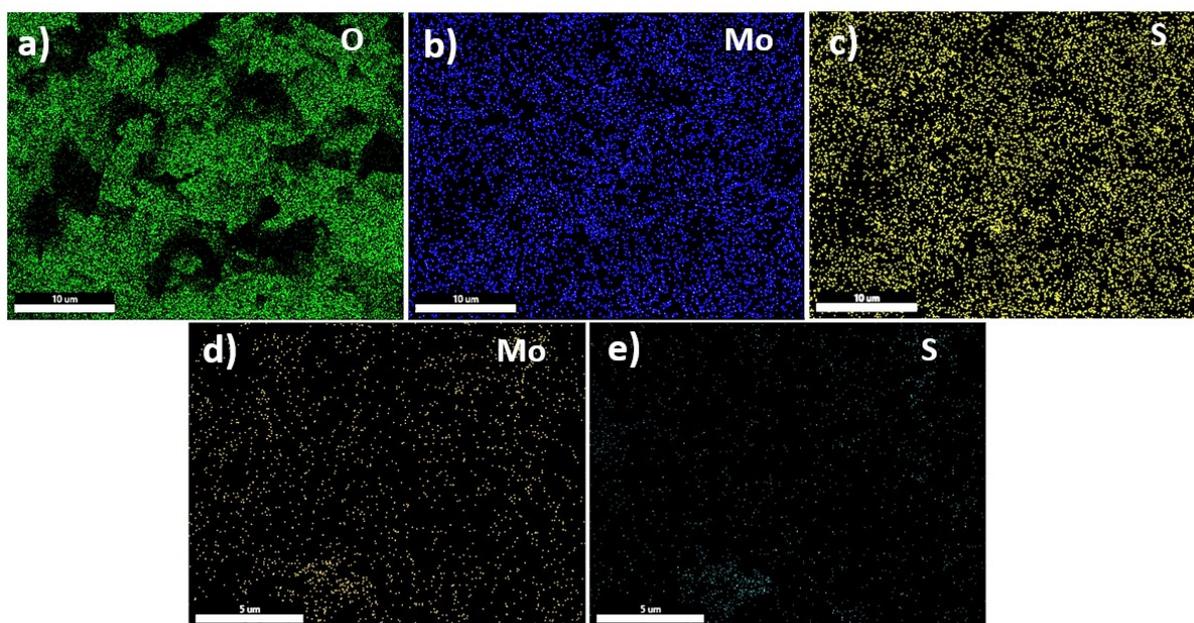


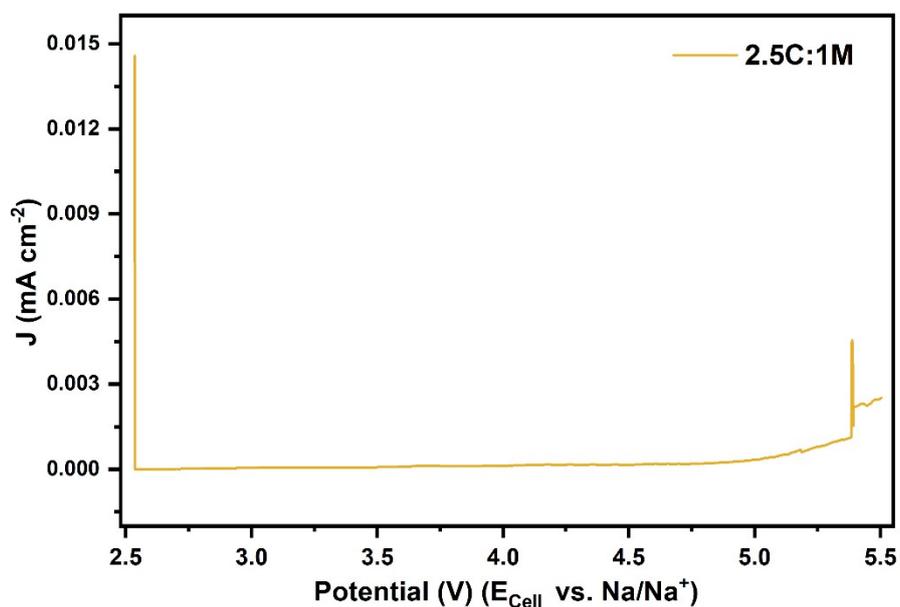
Figure S4: Energy Dispersive X-ray analysis of (a-c) cycled MoS₂ and (d-e) pristine MoS₂.

Table S1: Pristine 2.5C:1M

| Element | Weight % | MDL | Atomic % | Net Int. |
|---------|----------|------|----------|----------|
| C K | 47.7 | 0.20 | 58.2 | 284.8 |
| O K | 36.0 | 0.14 | 33.0 | 496.3 |
| Na K | 1.3 | 0.15 | 0.9 | 18.6 |
| Mg K | 0.4 | 0.14 | 0.2 | 5.4 |
| Al K | 4.1 | 0.16 | 2.2 | 49.5 |
| Si K | 10.6 | 0.18 | 5.5 | 104.3 |

Table S2: Cycled 2.5C:1M

| Element | Weight % | MDL | Atomic % | Net Int. |
|---------|----------|------|----------|----------|
| C K | 44.0 | 0.32 | 53.9 | 145.9 |
| O K | 41.6 | 0.25 | 38.3 | 297.6 |
| Na K | 1.7 | 0.32 | 1.1 | 10.2 |
| Mg K | 0.1 | 0.31 | 0.1 | 0.7 |
| Al K | 3.3 | 0.40 | 1.8 | 15.1 |
| Si K | 9.2 | 0.54 | 4.8 | 31.2 |

**Figure S5: Linear Sweep Voltammogram (LSV) of composite polymer electrolyte (CPE) (2.5C:1M) at a scan rate of 0.1 mV s⁻¹**

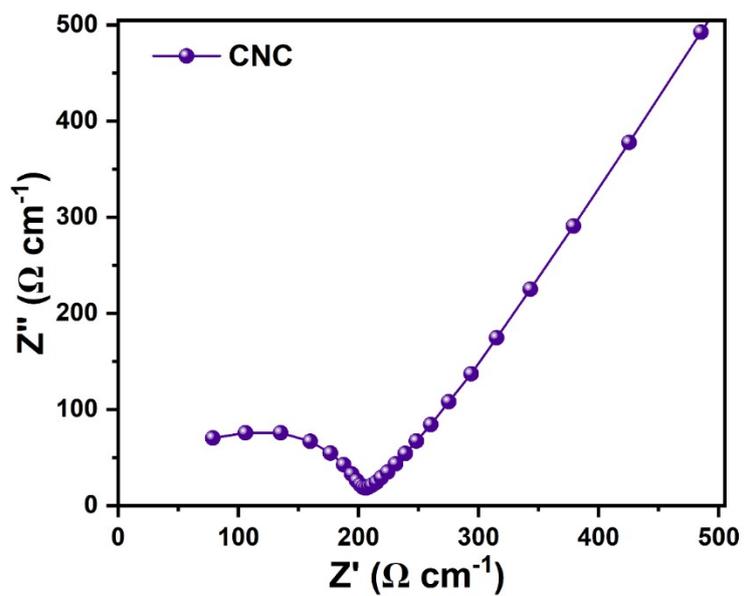


Figure S6: Nyquist plot of bare CNC at 25 °C.

$\sigma = 1.26 \times 10^{-5} \text{ S cm}^{-1}$ at 25 °C.

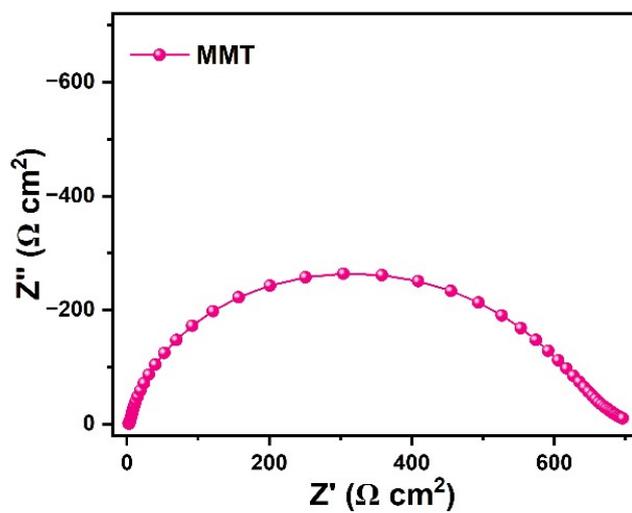


Figure S7: Nyquist plot of CNC-MMT (2.5C:1M) symmetric cell.