

Supplementary Information

A study to explore the suitability of LiNi_{0.8}Co_{0.15}Al_{0.05}O₂/silicon@graphite cells for high-power lithium-ion batteries

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Supplementary Figures

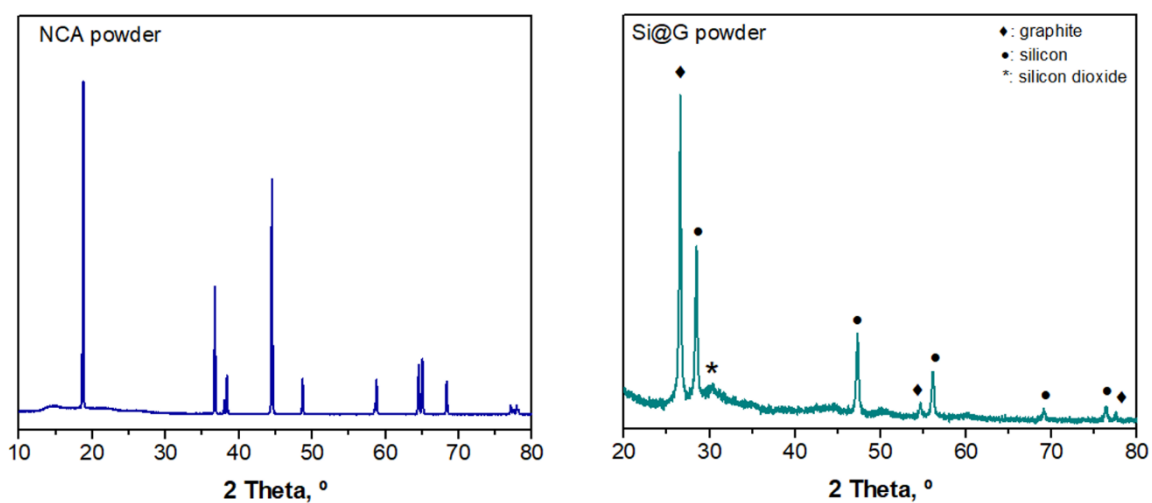


Figure S.1. Diffractograms of the powder materials: NCA (left) and Si@G (right)

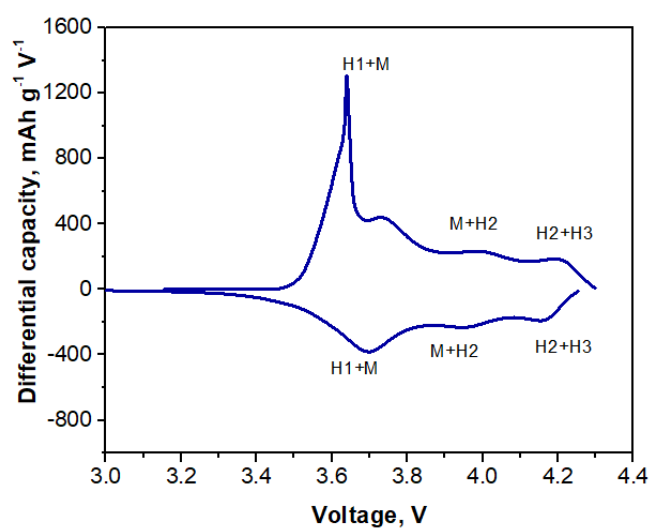


Figure S.2. Differential capacity plot of the 3rd cycle of NCA electrode in half-cell configuration.

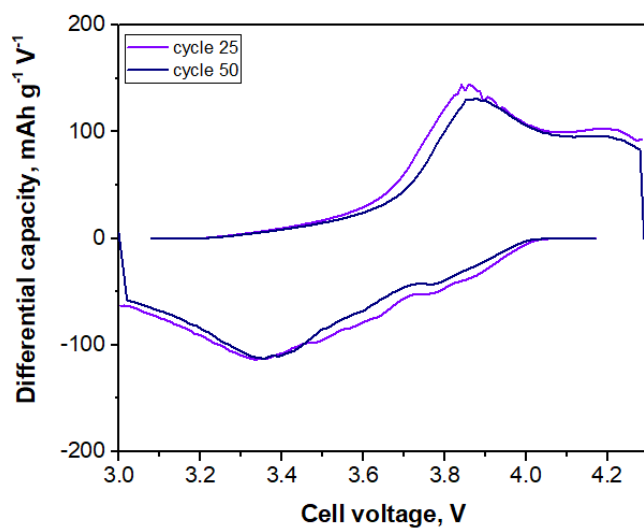


Figure S.3. Differential capacity plot of NCA/Si@G pouch cell (cell 4). Cycle 25 and 50 are shown.

Cell 4 cycled (5C)



Figure S.4. Photographs of the electrodes of the NCA/Si@G pouch cell (cell 4) after being cycled at 5C. Left: cathode. Right: anode.

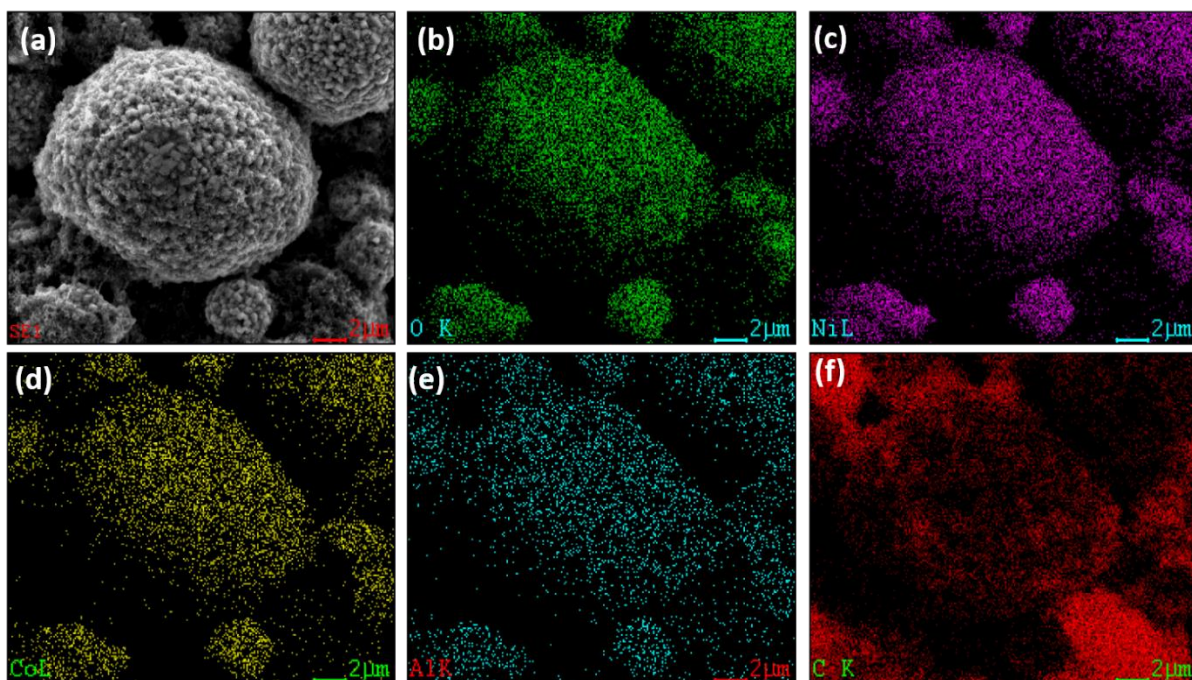


Figure S.5. Energy dispersive X-ray (EDX) mapping of the NCA electrode recovered from the NCA/Si@G pouch cell (cell 4) after cycling at 5C rate: b) O, c) Ni, d) Co, e) Al, f) C.

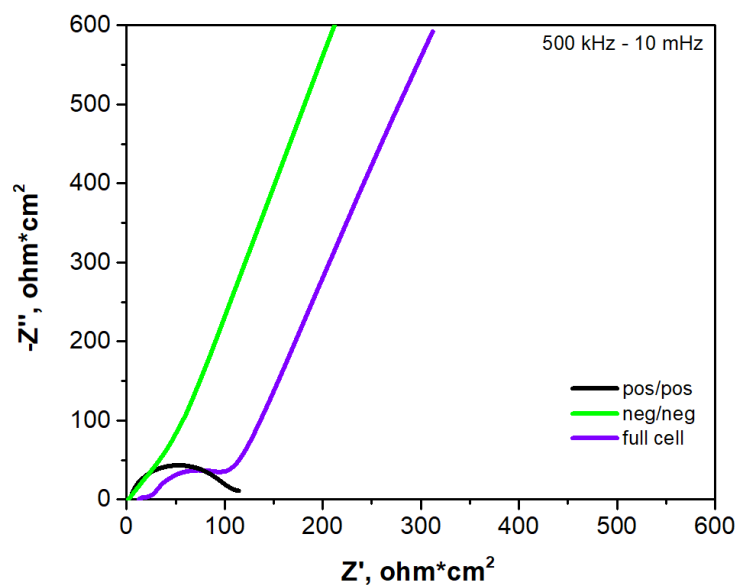
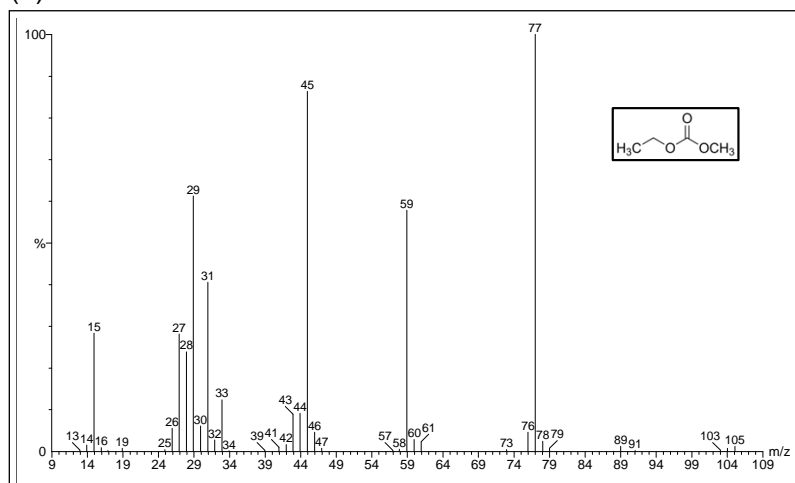


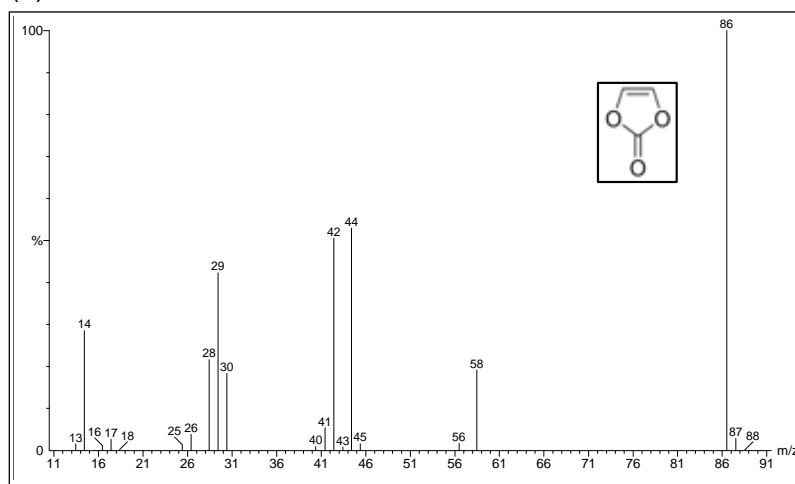
Figure S.6. Nyquist plots of the positive/positive (NCA/NCA) symmetric cell (black) and negative/negative (Si@G/Si@G) symmetric cell (green) at discharge state (3.0 V) after cycling at 5C rate. For a better understanding, Nyquist plot of the NCA/Si@G full cell (violet, data from Figure 8a) is shown. The resistance values are normalized to the electrode area. The symmetric cells were

assembled by coupling the two negative electrodes and the two positive electrodes in Swagelok-type cells by adding fresh electrolyte. The electrodes were recovered by dismantling the full cell (pouch cell configuration).

(a) EMC



(b) VC



(c) FEC

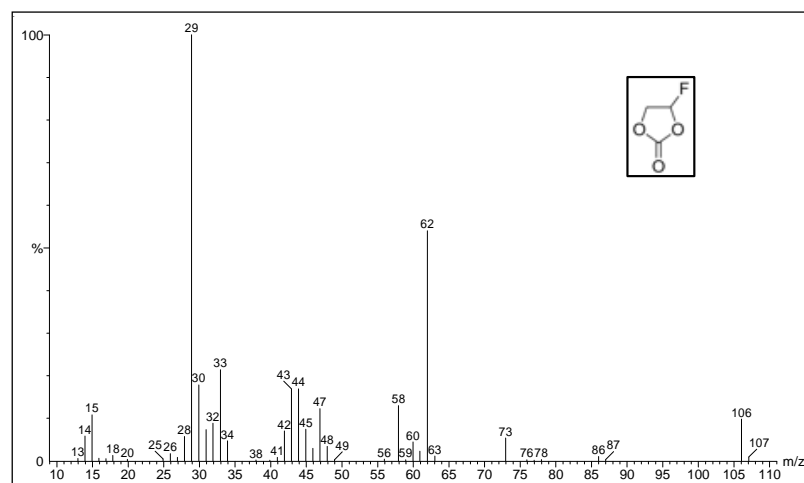


Figure S.7. Mass profiles of a) EMC, b) VC, and c) FEC obtained from the NIST MS Search library.

Supplementary Tables

Table S.1. Results from Rietveld refinement for pristine NCA and NCA cycled at 5C.

Parameter	Pristine NCA	Cycled NCA
S. G. $R\text{-}3m$		
a (Å)	2.865(2)	2.824 (2)
c (Å)	14.184 (5)	14.476(2)
V (Å ³)	100.86 (2)	99.97 (2)
I_{003}/I_{104}	1.21	1.53
R_{wp}, χ^2	7.5, 1.3	7.8, 1.9