

Supplementary Material

Tragacanth, an Exudate Gum as Suitable Aqueous Binder for High Voltage Cathode Material

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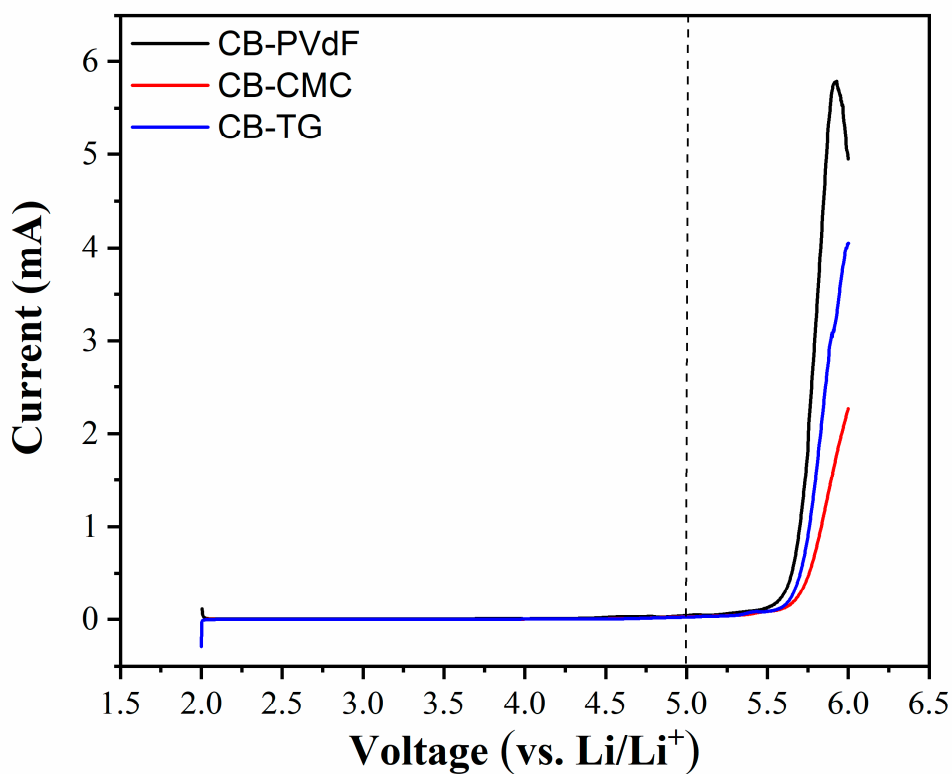


Figure S1. Linear sweep voltammetry, performed at 0.1 mV s⁻¹, of carbon black (CB) with different binders: PVdF, CMC and TG.

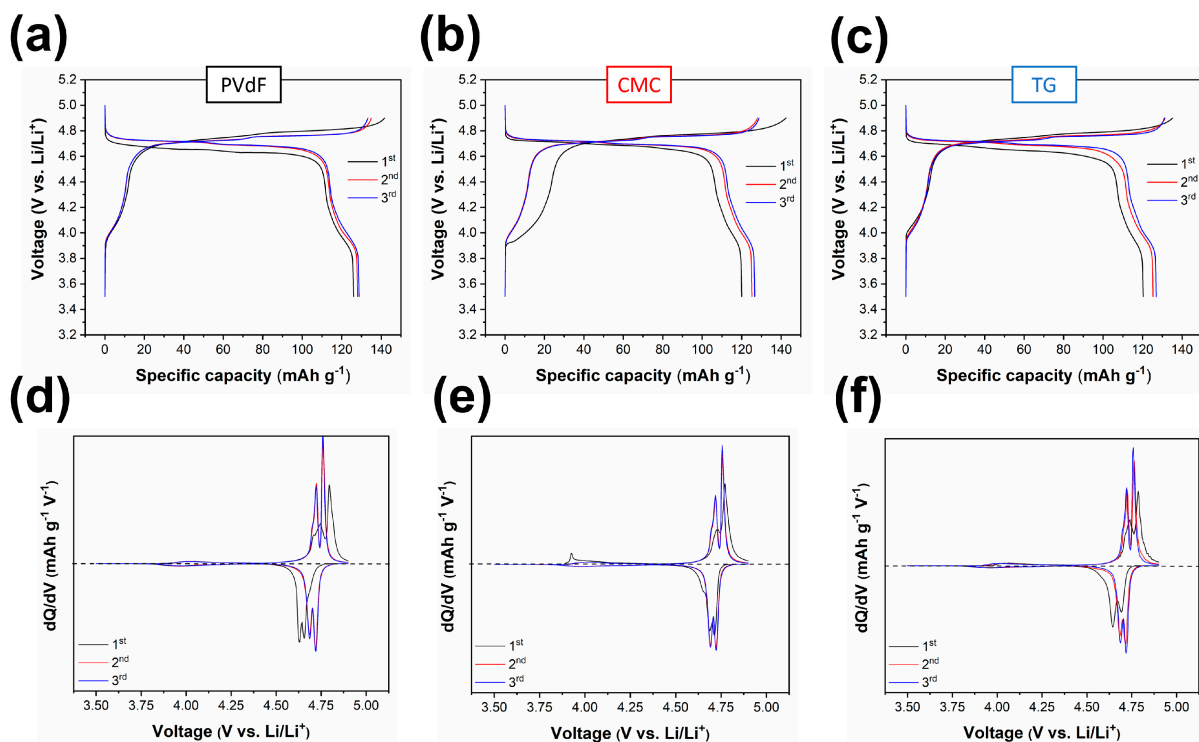


Figure S2. Charge–discharge curves of LNMO half cells with different binders for the three initial forming cycles at 0.1C: (a) LNMO-PVdF, (b) LNMO-CMC, (c) LNMO-TG. dQ/dV profiles related to first cycles charge–discharge curves: (d) LNMO-PVdF, (e) LNMO-CMC, (f) LNMO-TG.

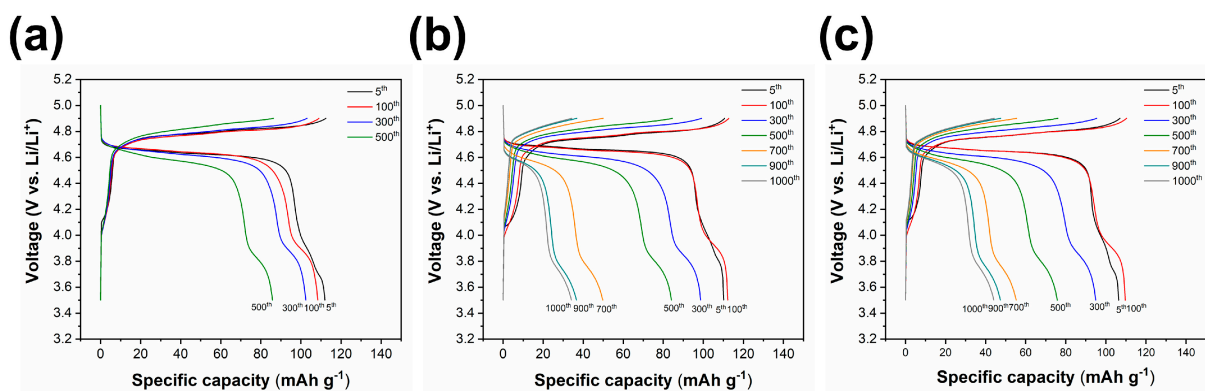


Figure S3. Charge–discharge curves of LNMO half cells with different binders: (a) PVdF, (b) CMC, (c) TG for long cycling performance at 1C.

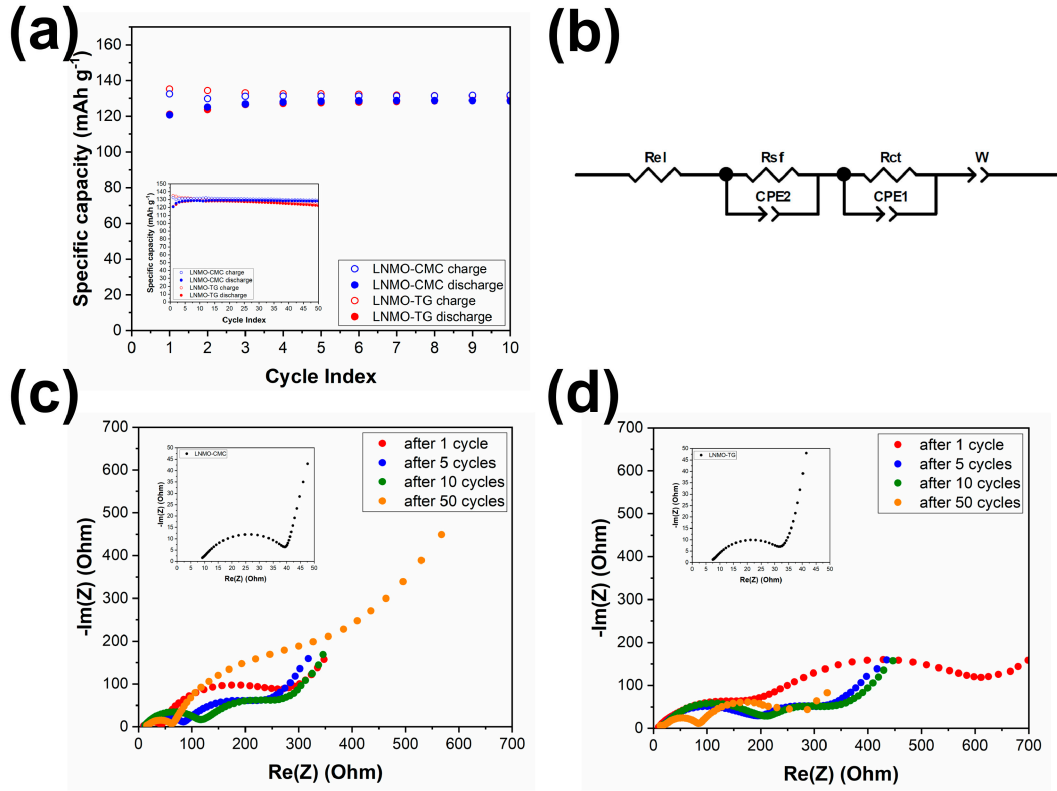


Figure S4. Comparison of specific discharge capacity of LNMO electrode containing TG and CMC, cycled at 0.1C for 50 cycles (a), adopted equivalent circuit for fitting (b), Nyquist plots for LNMO-CMC (c) and LNMO-TG (d) electrodes after different cycle numbers.

Table S1. Fitted impedance values based on Fig. S4 after different cycles in discharge state, for LNMO-CMC and LNMO-TG cycled at 0.1C.

	CMC	TG	CMC	TG	CMC	TG	CMC	TG	ΔR_{sf}	ΔR_{sf}	ΔR_{ct}	ΔR_{ct}
	R_{el}	R_{el}	R_{sf}	R_{sf}	R_{ct}	R_{ct}	W	W	(%)	(%)	(%)	(%)
Pristine	9	7	-	-	35	31	0.8	0.9	-	-	-	-
1 st	9	8	35	203	210	362	0.6	0.5	-	-	-	-
2 nd	10	11	57	206	180	122	0.6	0.5	+ 63	+ 1.5	- 14	- 66
3 rd	10	12	72	198	165	114	0.7	0.5	+ 106	+ 2.5	- 21	- 68
5 th	10	13	77	186	147	108	0.7	0.6	+ 120	+ 8	- 30	- 70
10 th	11	14	110	204	155	100	0.7	0.6	+ 214	+ 0.5	- 26	- 72
50 th	15	13	51	63	247	133	0.7	0.6	+ 46	- 69	+ 18	- 63

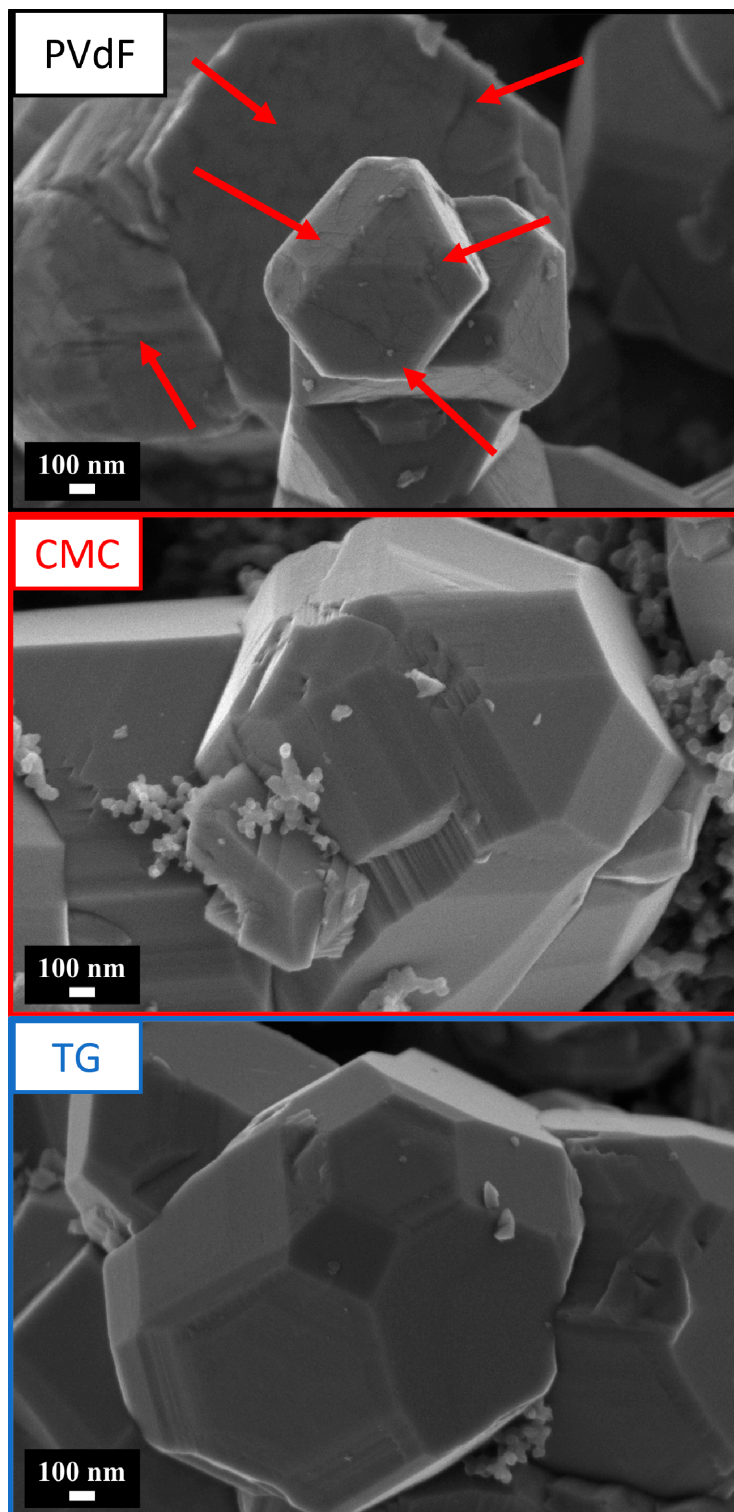


Figure S5. FE-SEM micrographs of pristine cathode containing PVdF, CMC and TG. The presence of microcracks in LNMO-PVdF electrode is highlighted by red arrows.