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Supplementary Information

Optimizing NCM811 Nickel-Rich Cathode Stability via Suppressing Asymmetric Li/Ni Mixing By "Non-Intrusive" Strategy

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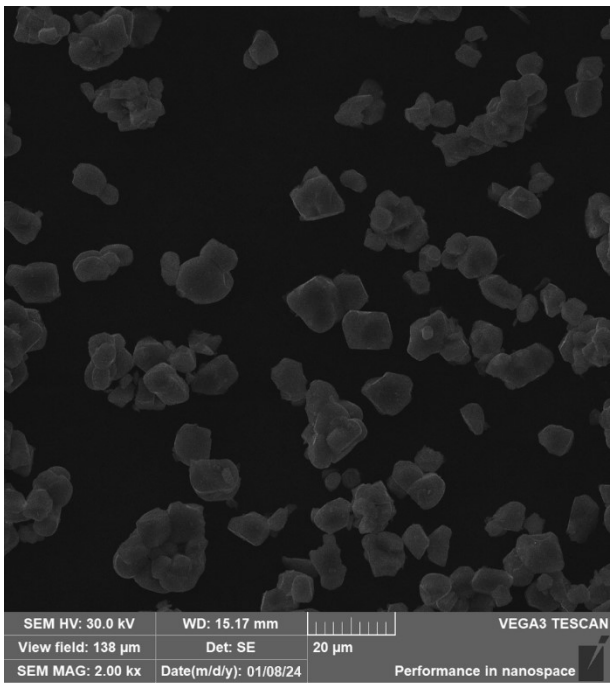

Figure S1. SEM images of single crystal sample S-S obtained by sintering at 950 ℃.

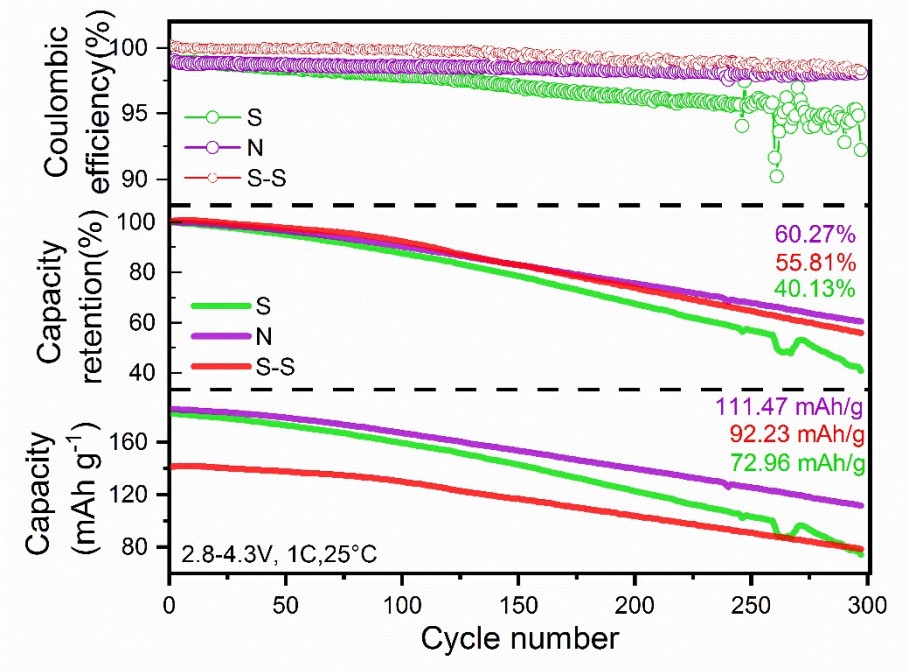

Figure S2. The coulombic efficiency, cycling performance and cycling capacity retentions at 1C for sample S, N and S-S in the cell potential of 2.8-4.3 V at 25 °C.

Both the modified sample N and the single crystal sample S-S exhibit the ability to maintain high Coulombic efficiency, particularly after 150 cycles. The capacity

retention rate change curve also demonstrates a similar trend, with the modified sample showing improved capacity retention rates after extended cycles compared to the single crystal sample S-S, increasing from 55.81% to 60.27%. Due to the polycrystalline morphology of the modified sample, it demonstrates superior capacity performance compared to single crystal samples. The modified sample combines the advantages of high capacity of polycrystalline morphology and the high stability of single crystal morphology.

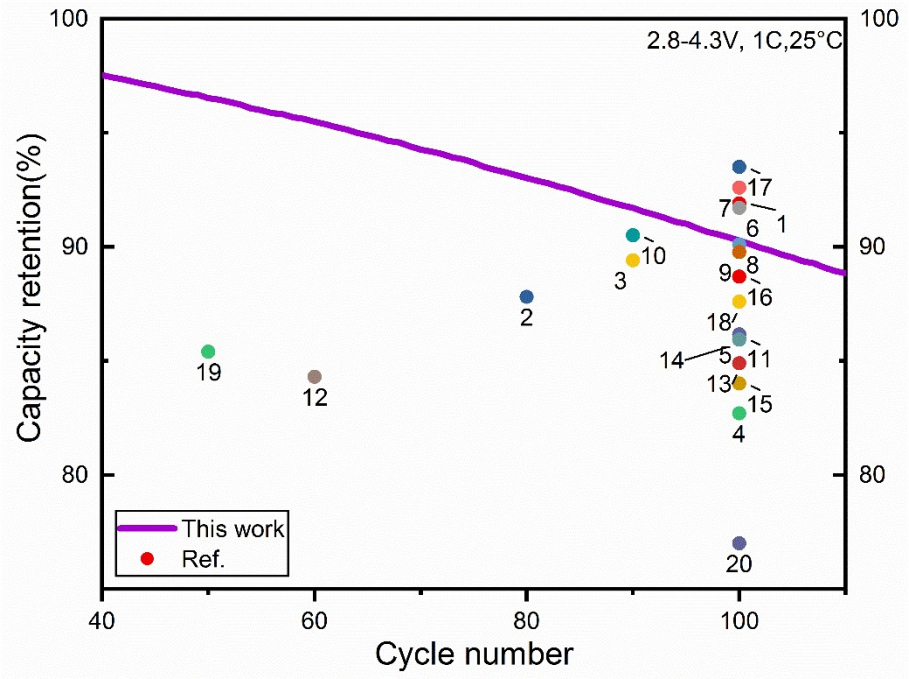

Figure S3. Comparison of the capacity retention rate of modified samples in this work with some reported literature (Half-cell vs Li/Li^+, 2.8-4.3V, 25℃, 1C=200 mA g^{-1}).

Table S1. Detailed information of the data points referenced in Figure S3.

NO.	Category	Strategy	Ref.	C-rate
1	single crystal	Surface modification	[1]	1C
2	polycrystal	Carbon coating	[2]	0.5C
3	polycrystal	Li_2SnO_3-Ag coating	[3]	1C
4	polycrystal	Na-doping and MgF_2 coating	[4]	0.5C
5	polycrystal	Core–Shell	[5]	0.5C
6	polycrystal	Al_2O_3 coating	[6]	1C
7	polycrystal	$LiAlO_2$/Li2SiO_3 coating	[7]	1C
8	polycrystal	MgO coating	[8]	1C
9	polycrystal	Carbonized Polymer Dots coating	[9]	0.5C
10	polycrystal	Ag coating	[10]	1C
11	single crystal	Ti-doping	[11]	0.2C
12	single crystal	Zr doping	[12]	0.2C
13	polycrystal	SiO_2 coating	[13]	0.2C
14	polycrystal	Sb-doped Zn_2SnO_4	[14]	1C
15	polycrystal	Ti doping	[15]	1C
16	polycrystal	PANI-PVP coating	[16]	1C
17	polycrystal	$LiNbO_3$ coating	[17]	1C
18	polycrystal	$LiPF_6$ doping	[18]	1C
19	single crystal	Li_3PO_4-$AlPO_4$-$Al(PO_3)_3$ coating	[19]	0.5C
20	polycrystal	MXene ($Ti_2C_3T_x$) modification	[20]	0.5C

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