

## Electronic Supplementary Information

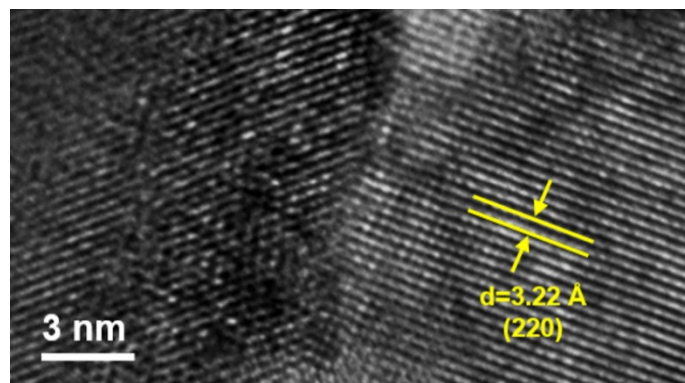
# Boosting the Electrochemical Performance and Moisture Stability of O3-type $\text{NaNi}_{1/3}\text{Fe}_{1/3}\text{Mn}_{1/3}\text{O}_2$ Cathodes using Novel $\text{Na}_2\text{MoO}_4$ Coatings Prepared via a Polyvinylpyrrolidone-anchored Complex Coating Process

Minjun Kim<sup>a</sup>, Minsu Choi<sup>a</sup> and Wonchang Choi<sup>a\*</sup>

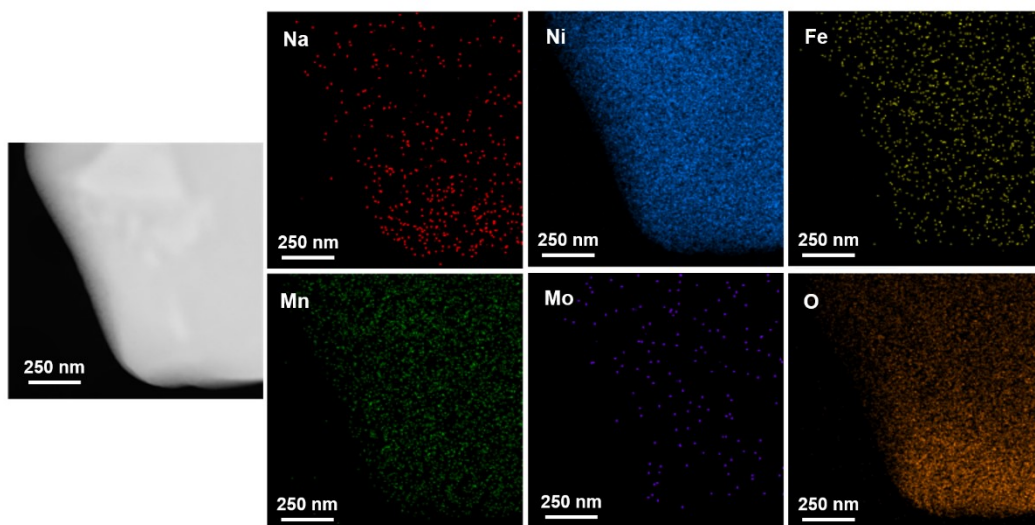
<sup>a</sup>Department of Energy Engineering, Konkuk University, 120, Neungdong-ro, Gwangjin-gu, Seoul 05029, Republic of Korea

\*Corresponding author Tel.: +82 2-2049-6051

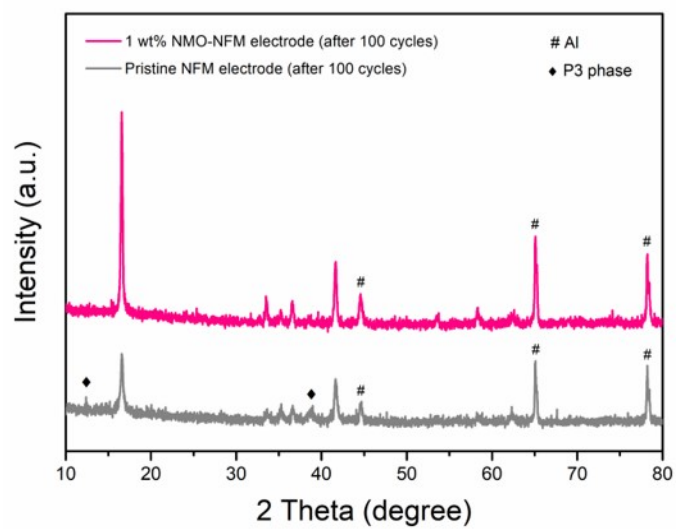
E-mail address: [wchoi@konkuk.ac.kr](mailto:wchoi@konkuk.ac.kr) (Prof. W. Choi)



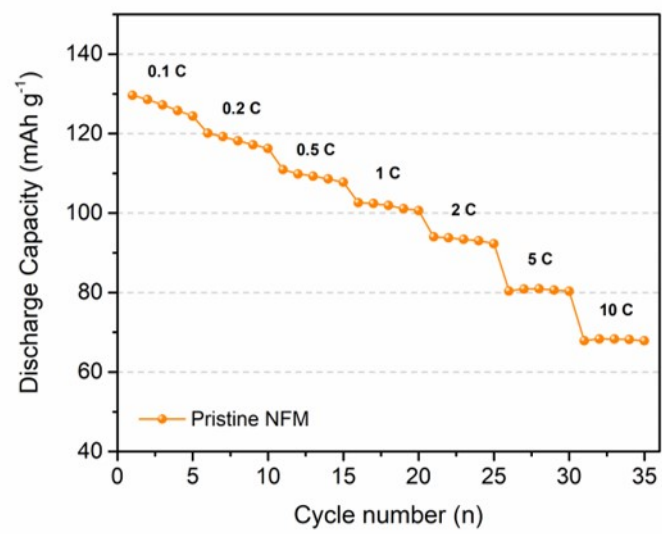
**Fig. S1.** HR-TEM image of 2wt% NMO-NFM at interface between bulk and coating layer.



**Fig. S2.** EDS mapping images of Na, Ni, Fe, Mn, Mo, and O in 1 wt% NMO-NFM.



**Fig. S3.** XRD patterns of cycled pristine NFM and 1 wt% NMO-NFM electrodes (after 1C for 10 cycles).



**Fig. S4.** Rate capability at various current densities for 0.5 wt% NMO-NFM.

**Table. S1** Element analysis tested by ICP-MS for the pristine NFM, 1 wt% NMO-NFM and 2 wt% NMO-NFM cathode materials.

	Na (wt%)	Ni (wt%)	Fe (wt%)	Mn (wt%)	Mo (wt%)	Na <sub>2</sub> MoO <sub>4</sub> (wt%) †
Pristine NFM	21.06	18.10	17.07	16.71	-	-
1 wt% NMO-NFM	21.38	18.01	17.01	16.65	0.21	0.95
2 wt% NMO-NFM	21.65	17.87	16.95	16.28	0.44	1.98

†Calculated based on the Mo content from ICP-MS.

**Table. S2** Comparison of the electrochemical performance of 1 wt% NMO-NFM and other SIBs cathode materials.

Ref.	Cathode	Modification	Voltage range (V)	Discharge capacity at 0.1C (mAh cm <sup>-1</sup> )	Discharge capacity at 10C (mAh cm <sup>-1</sup> )	Electrolyte
This work	NaNi <sub>1/3</sub> Fe <sub>1/3</sub> Mn <sub>1/3</sub> O <sub>2</sub>	Na <sub>2</sub> MoO <sub>4</sub> coating	2.0–4.0	127.96	81.13	1M NaClO <sub>4</sub> in EC:PC:DEC=1:1:1+3 wt% FEC
[26]	NaNi <sub>1/3</sub> Fe <sub>1/3</sub> Mn <sub>1/3</sub> O <sub>2</sub>	TiO <sub>2</sub> coating	1.5–4.2	160.9	30.0	1M NaClO <sub>4</sub> in PC
[27]	NaNi <sub>1/3</sub> Fe <sub>1/3</sub> Mn <sub>1/3</sub> O <sub>2</sub>	ZrO <sub>2</sub> coating	1.5–4.0	123.8	59.9	1M NaClO <sub>4</sub> in PC
[47]	NaNi <sub>1/3</sub> Fe <sub>1/3</sub> Mn <sub>1/3</sub> O <sub>2</sub>	NaTi <sub>2</sub> (PO <sub>4</sub> ) <sub>3</sub> coating	1.5–4.2	164.1	68.2	1M NaClO <sub>4</sub> in PC+5 vol% FEC
[55]	NaMn <sub>0.48</sub> Ni <sub>0.2</sub> Fe <sub>0.3</sub> Mg <sub>0.02</sub> O <sub>2</sub>	Mg doping	1.5–4.2	136	10	1M NaClO <sub>4</sub> in PC
[56]	NaFe <sub>0.25</sub> Mn <sub>0.25</sub> Ni <sub>0.25</sub> Ti <sub>0.25</sub> O <sub>2</sub>	Ti doping	1.5–4.0	145	59.5	1M NaPF <sub>6</sub> in PC+2t% FEC