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Supporting information for

Surface transformation by a "cocktail" solvent enables stable cathode materials for sodium ion batteries

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Table S1

		Na	Ni	Fe	Mn
Pristine $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$	XPS	1.345	0.275	0.319	0.406
	EDS	1	0.33	0.33	0.33
Coated $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$	XPS	1.629	0.268	0.306	0.426
	EDS	1	0.33	0.33	0.33

Table S1 The ratio of Na, Ni, Fe and Mn given by X-ray photoelectron spectroscopy (XPS) and

Energy-dispersive X-ray spectroscopy (EDS) after normalizing transition metal (Ni, Fe and Mn) equal to 1.

Supporting figures

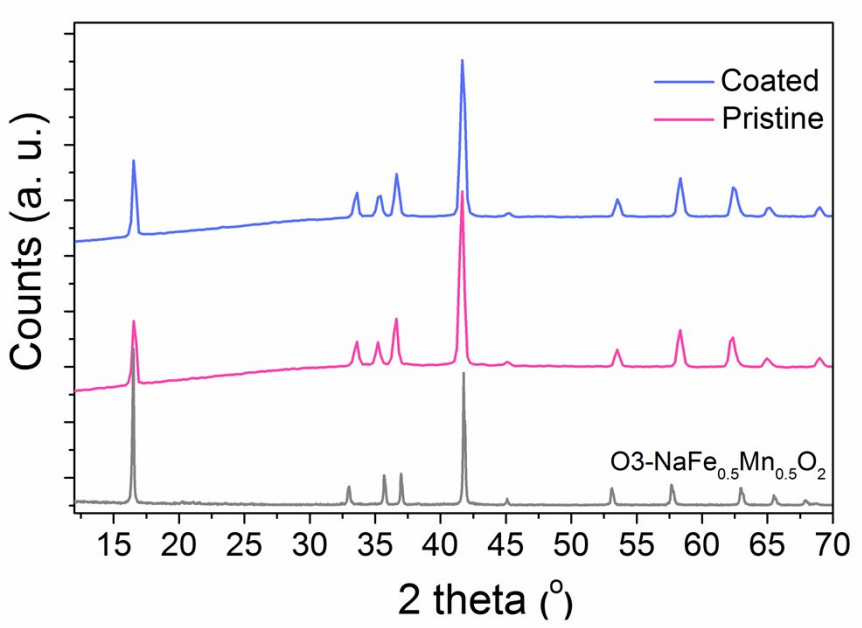

Figure S1 XRD patterns of pristine and coated O3-$NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$ samples as well as O3-$NaFe_{0.5}Mn_{0.5}O_2$ material. The powder XRD patterns were carried out on a PANalytical X-ray diffractometer with the Cu K_α (λ=1.54 Å) radiation.

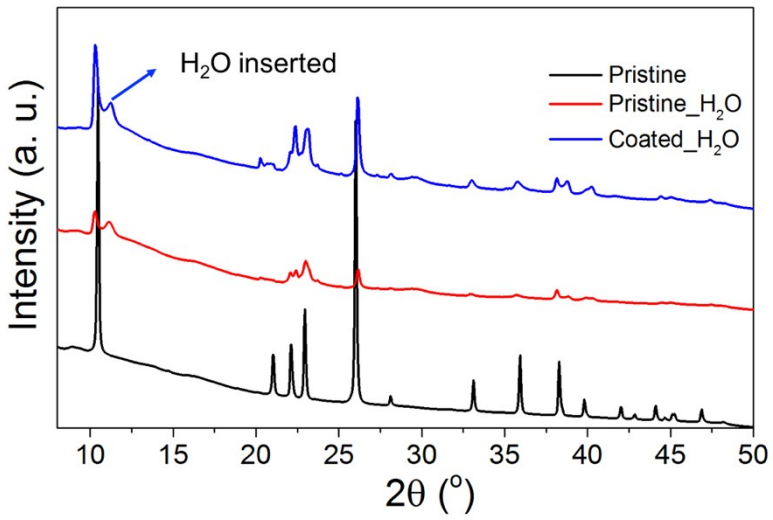

Figure S2 The stability of pristine and coated $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$ samples against water; the XRD patterns of three sample suggest the improvement in stability of the coated $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$ sample. The wavelength of synchrotron X-ray radiation was 0.976 Å.

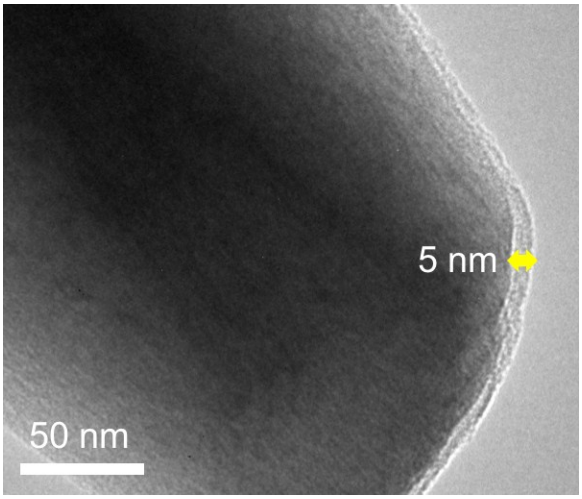

Figure S3 TEM image for coated $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$ samples after soaking in water for 3 days. The conformal layer remains its structure after water soaking.

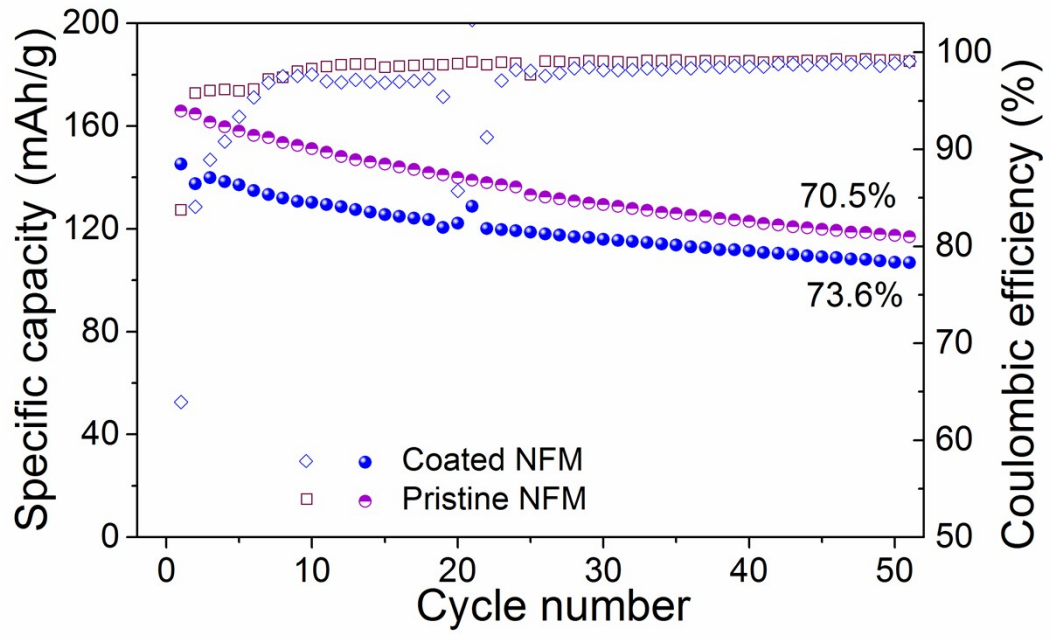

Figure S4 Cycling performance of coin cells consisting of pristine and coated $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$ electrodes at the current rate of C/10 in the voltage range of 2.0-4.3 V.

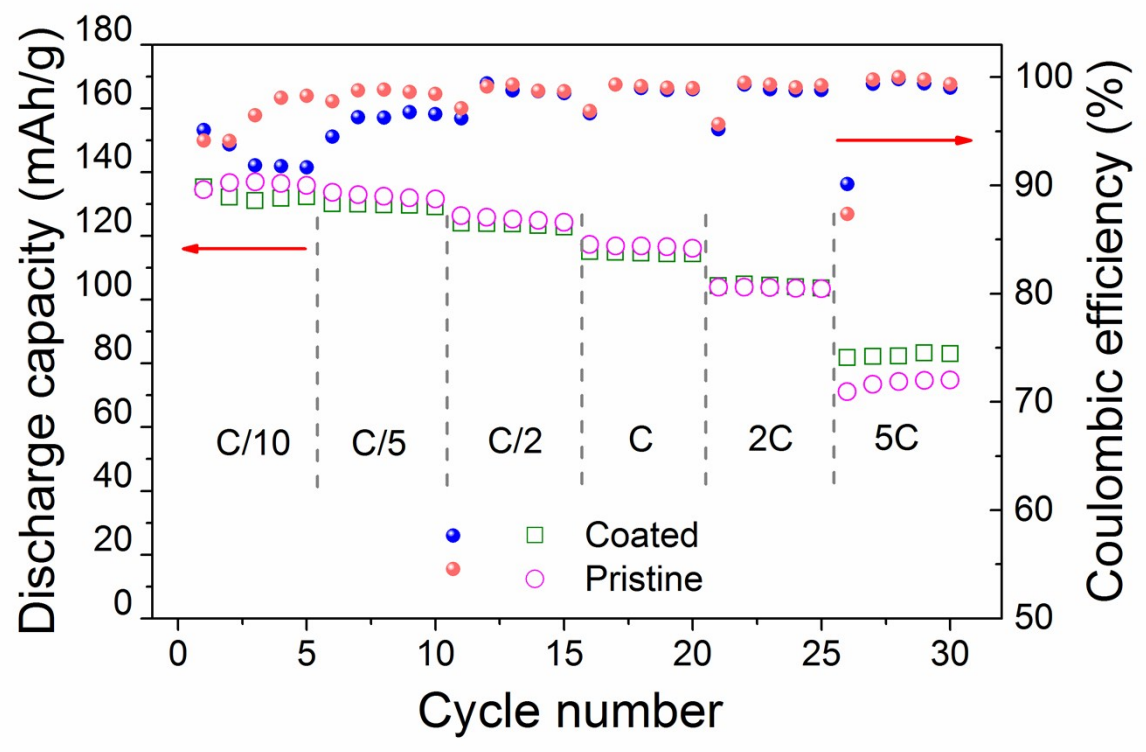

Figure S5 Rate performance of coin cells containing pristine and coated $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$ cathode materials cycled in the voltage range of 2.0–4.0 V.

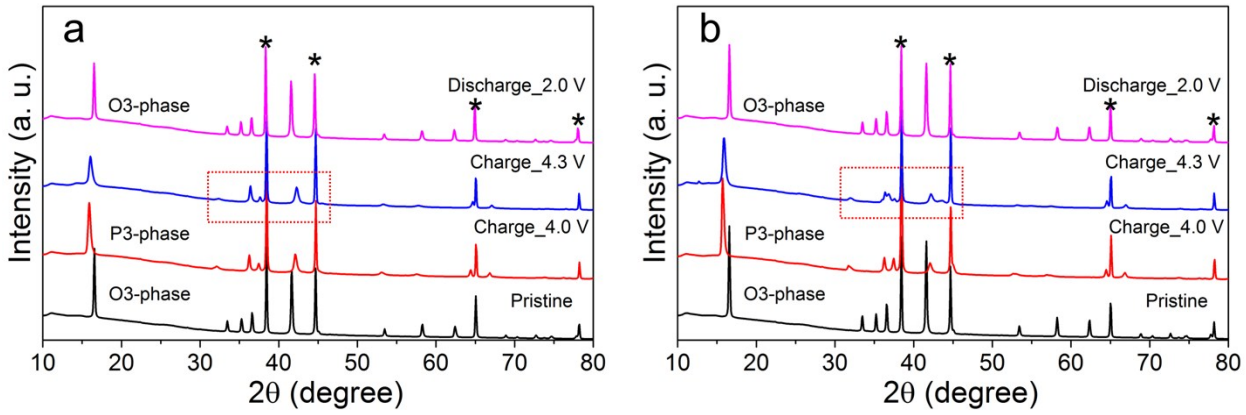

Figure S6 *Ex situ* XRD patterns of the coated (a) and the pristine $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$ cathodes (b) electrodes at different states of charge; the dashed rectangle inserted in the figures shows the phase change at the state of charged to 4.3 V for the pristine cathode. The asterisks are the peaks form Al current collector. Note that the C- $NaNi_{1/3}Fe_{1/3}Mn_{1/3}O_2$ cathode can remain P3-phase at high charge state of 4.3 V, while new peaks emerge in the pristine cathode (emphasized in the red dashed rectangle), indicating the structure transformation at the charge state of 4.3 V. The wavelength of synchrotron X-ray radiation was 0.997 Å and the *x*-axis (2 theta) value were converted to the laboratory Cu radiation source (Cu K_α wavelength is 1.5406 Å).