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SUPPORTING INFORMATION

One-dimensional nanostructured design of $Li_{1+x}(Mn_{1/3}Ni_{1/3}Fe_{1/3})O_2$ as a dual cathode for lithium-ion and sodium-ion batteries

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Table S1: Rietveld refinement parameters of LMNFO NP and LMNFO NF corresponding to $R\bar{3}m$ phase group.

$Li(Ni_{1/3}Mn_{1/3}Fe_{1/3})O_2$ – NP space group = $R\bar{3}m$ $a = b = 2.9224(2)$ Å $c = 14.359(3)$ Å						
Atoms	Site	*x*	*y*	*z*	Atomic displacement parameter (Å^2)	Site occupancy
Li1	3b	0	0	0.5	2.5(4)	0.72(1)
Ni1	3b	0	0	0.5	2.5(4)	0.28(1)
Li2	3a	0	0	0	0.8(2)	0.28(1)
Ni2	3a	0	0	0	0.8(2)	0.05(1)
Mn2	3a	0	0	0	0.8(2)	0.33
Fe2	3a	0	0	0	0.8(2)	0.33
O1	6c	0	0	0.2563(6)	1.5(2)	1

$Li(Ni_{1/3}Mn_{1/3}Fe_{1/3})O_2$ – NF space group = $R\bar{3}m$ $a = b = 2.9211(2)$ Å $c = 14.368(3)$ Å						
Atoms	Site	*x*	*y*	*z*	Atomic displacement parameter (Å^2)	Site occupancy
Li1	3b	0	0	0.5	2.7(4)	0.74(1)
Ni1	3b	0	0	0.5	2.7(4)	0.26(1)
Li2	3a	0	0	0	2.1(2)	0.26(1)
Ni2	3a	0	0	0	2.1(2)	0.07(1)
Mn2	3a	0	0	0	2.1(2)	0.33
Fe2	3a	0	0	0	2.1(2)	0.33
O1	6c	0	0	0.2577(6)	2.4(2)	1

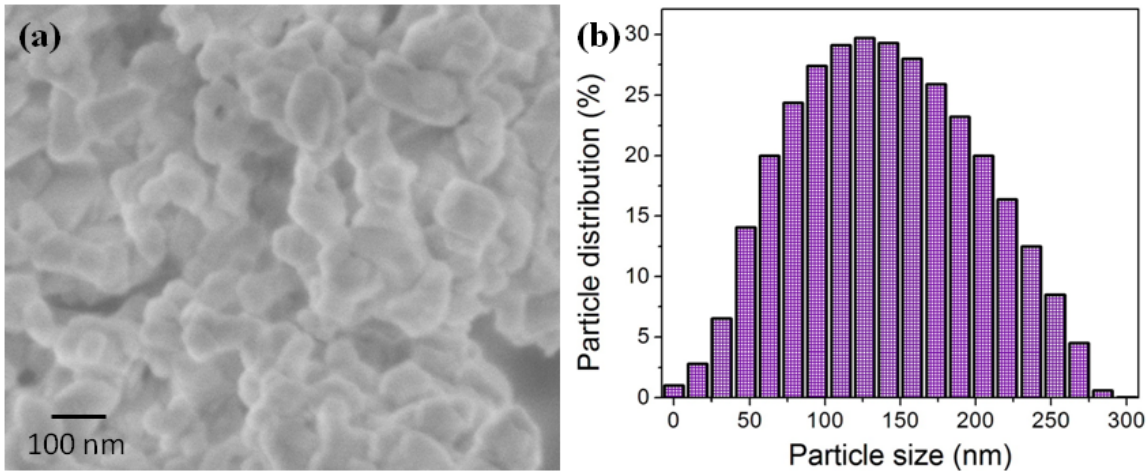

Fig. S1: (a) SEM image of LMNFO NP and (b) corresponding particle size distribution.

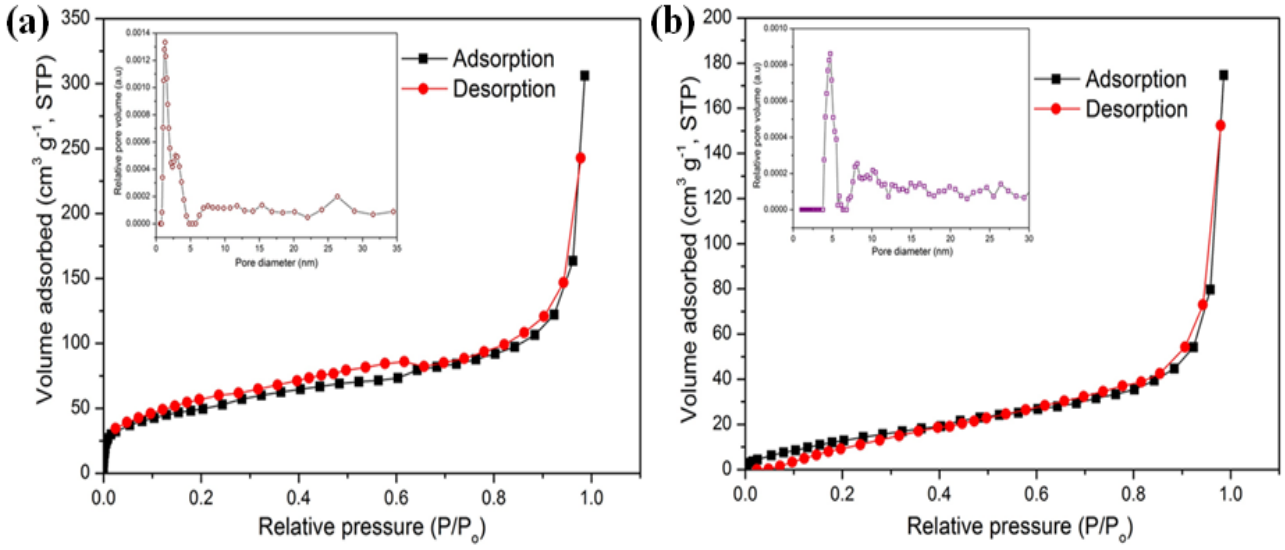

Fig. S2: N_2 adsorption and desorption isotherms of (a) LMNFO NF and (b) LMNFO NP (insets: pore diameter size distribution of LMNFO NF and LMNFO NP, respectively).

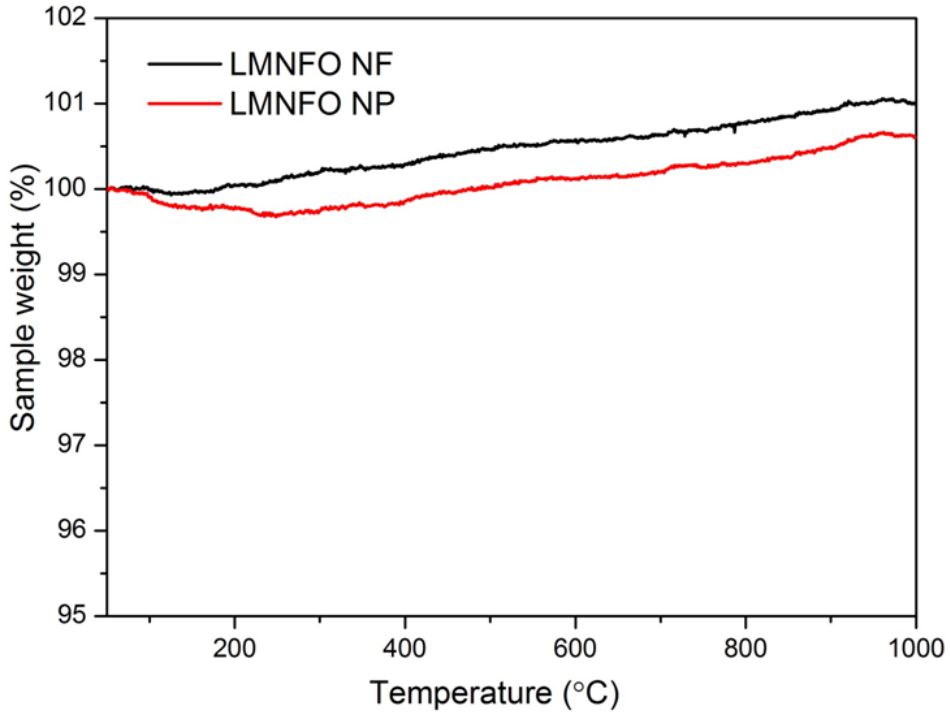

Fig. S3: TGA curves of LMNFO NF and LMNFO NP.

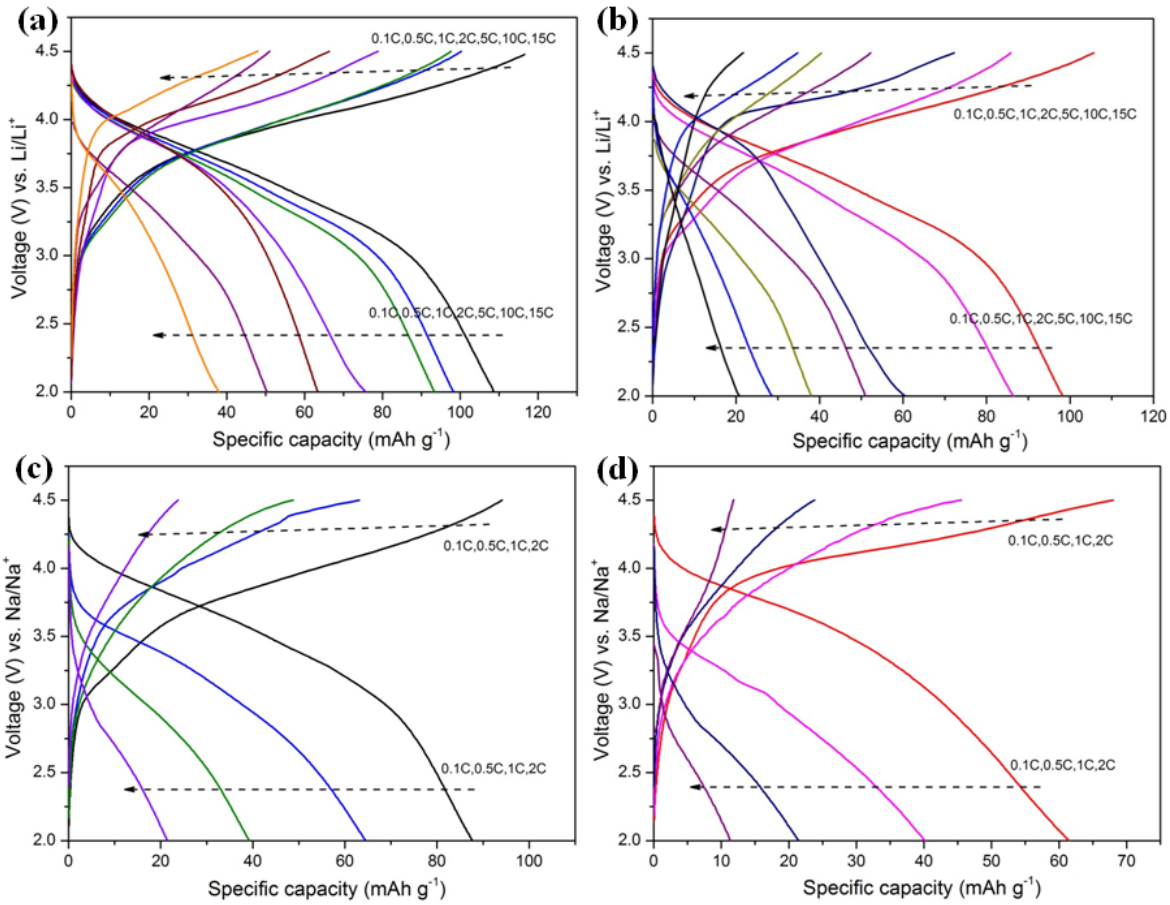

Fig. S4: (a) & (b) Charge-discharge curves of LMNFO NF and LMNFO NP, respectively at various current rates in LIBs; (c) & (d) Charge-discharge curves of LMNFO NF and LMNFO NP, respectively, at various current rates in SIBs, in the voltage range of 2 – 4.5 V.

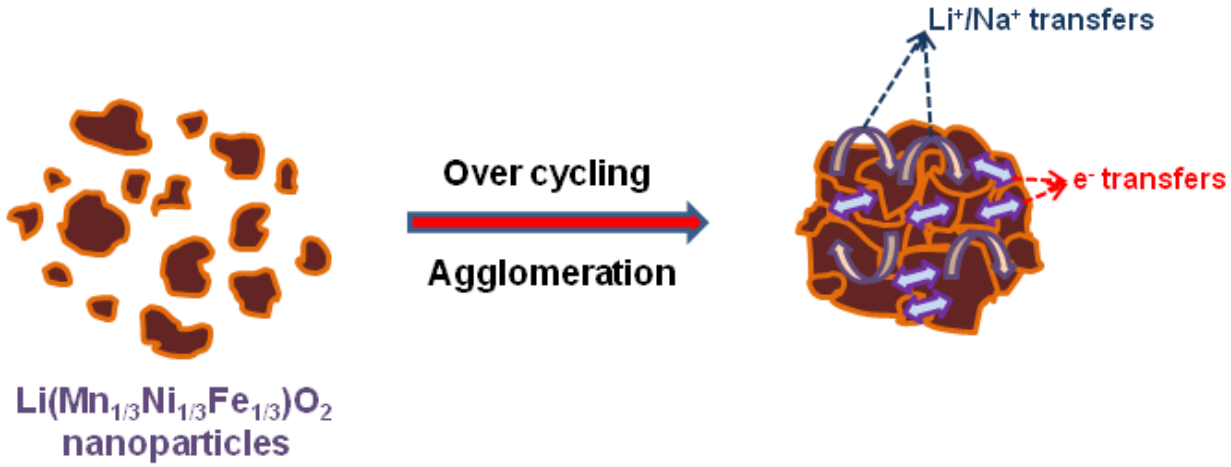

Fig. S5: Schematic representation of the self-agglomeration phenomenon in nanoparticles that occur during cycling and their charge transfer kinetics.

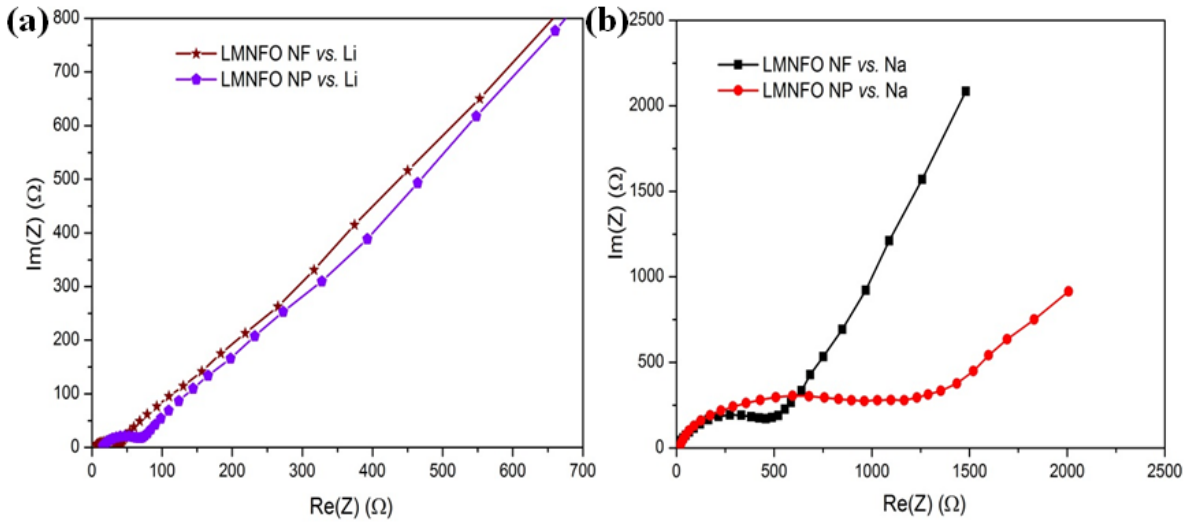

Fig. S6: Electrochemical impedance spectroscopy Nyquist plots of LMNFO NF and LMNFO NP in (a) LIBs and (b) SIBs, at open circuit voltage and in the frequency range of 100 kHz to 100 mHz.