Electronic supporting information

Hollow $Li_{1.2}Mn_{0.54}Ni_{0.13}Co_{0.13}O_2$ micro-spheres synthesized by a co-precipitation method as high-performance cathode material for Li-ion batteries

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Supporting Figure and Tables

The presence and homogenous distribution of Ni, Co, and Mn elements inside the hollow micro-spheres was identified by EDX chemical mapping of a halved sphere. The corresponding images are shown in Fig. S1.

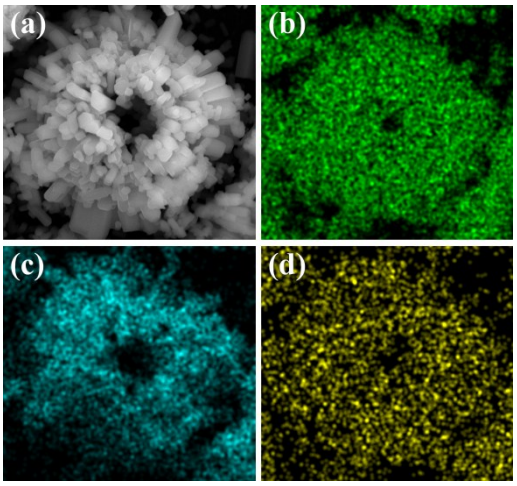

Fig. S1 SEM/EDX electron image (a) and element mapping images of Mn (b), Ni (c), Co (d) in a h-LMNC particle.

Table S1 Element molar ratios of s-LNCM and h-LNCM obtained from ICP analysis.

Samples	Element	Li	Mn	Ni	Co
s-LNCM	Content (ppm)	5.365	19.398	4.835	4.911
	Molar ratio	1.197	0.541	0.128	0.130
h-LNCM	Content (ppm)	5.892	21.268	5.343	5.426
	Molar ratio	1.199	0.541	0.129	0.131

Table S2 Specific surface area, pore volume and average pore diameter of s-LNCM and h-LNCM obtained by nitrogen absorption method.

Sample	Specific surface area ($m^2\ g^{-1}$)	Pore volume ($cm^3\ g^{-1}$)	Average pore diameter (nm)
s-LNCM	1.127	0.0266	9.429
h-LNCM	1.631	0.0249	6.105

Table S3 Specific surface area, pore volume and average pore diameter of s-LNCM and h-LNCM obtained by mercury intrusion method.

Sample	Specific surface area ($m^2\ g^{-1}$)	Pore Volume ($cm^3\ g^{-1}$)	Average pore diameter (μm)
s-LNCM	0.7851	0.0594	0.3027
h-LNCM	1.3603	0.4700	1.3820

Table S4 The values of R_e, R_{SEI} and R_{ct} of h-LMNC and s-LMNC after initial cycle and 100 cycles.

Samples	$R_e\,(\Omega)$		$R_{SEI}\,(\Omega)$		$R_{ct}\,(\Omega)$	
	1^{st}	100^{th}	1^{st}	100^{th}	1^{st}	100^{th}
h-LMNC	2.381	3.433	15.61	81.02	54.73	339.6
s-LMNC	2.453	3.284	21.52	134.5	85.49	832.2