

Effectively enhanced structural stability and electrochemical properties of $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ cathode materials via poly-(3,4-ethylenedioxythiophene)-*in-situ* coated for high voltage Li-ion batteries

JinFeng Liu, YuFang Chen, JinXu*, WeiWei Sun, ChunMan Zheng, YuJie Li

(college of Aerospace Science and Engineering, National University of Defense Technology, Chang Sha 410073, China)

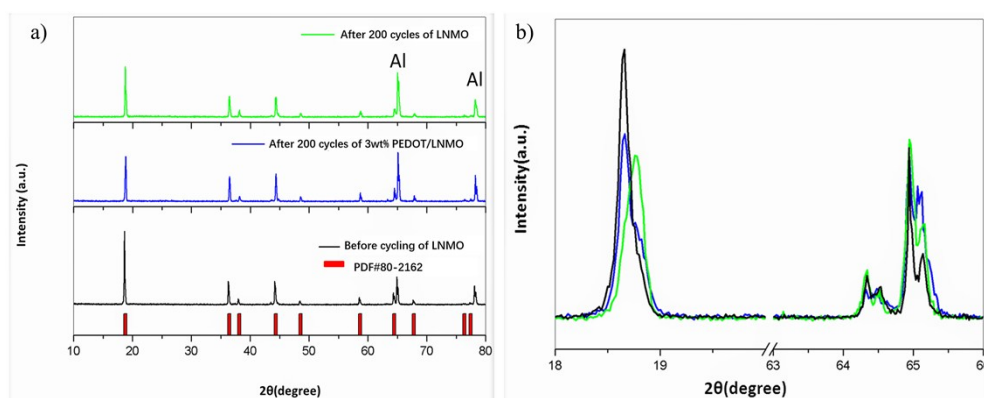


Fig.S1. (a) XRD patterns of the fresh and cycled $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$ electrodes in base and 3wt%PEDOT@LNMO, (b) partial patterns of these samples.

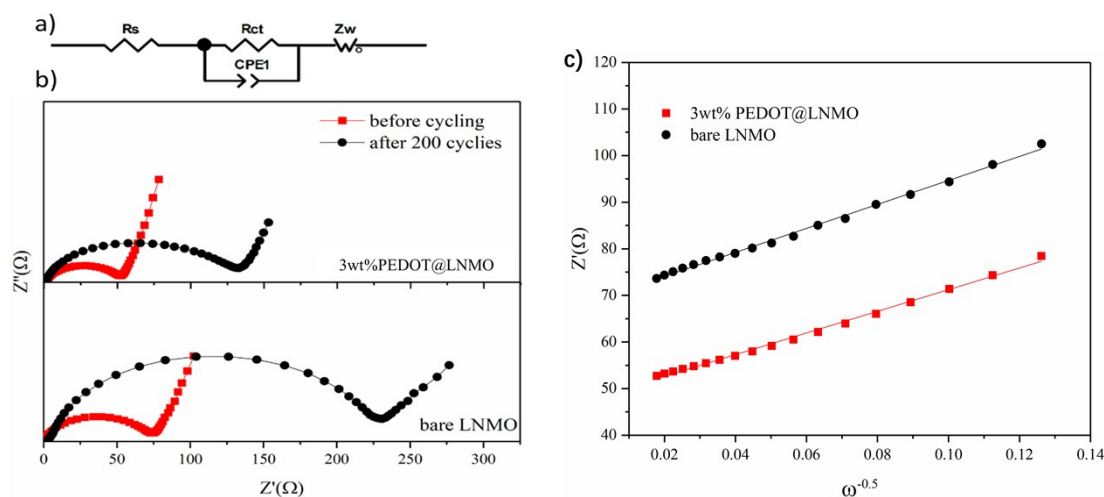


Fig.S2. (a) equivalent circuit used for simulating the experimental impedance data, (b) Nyquist plots of the pristine LNMO and 3wt% PEDOT@LNMO before cycling and after 200 cycles, (c) z' vs. $\omega^{-0.5}$ plots in the low-frequency region obtained from EIS measurements of bare LNMO and 3wt%PEDOT@LNMO before cycling.

* Corresponding author. Tel.: +8615607499928. E-mail address: xujin503@163.com

Table.S1. the results of electronic conductivity of samples

Samples	Diameter (mm)	Thickness (mm)	Current (μA)	Resistivity ($\text{k}\Omega \text{cm}^{-1}$)	Electrical conductivity (S cm^{-1})
Pristine LNMO	13	0.5	0.22	102.65	9.74×10^{-6}
1wt%PEDOT @LNMO	13	0.424	0.1827	2.34	4.27×10^{-4}
3wt%PEDOT @LNMO	13	0.452	0.1946	0.33	3.3×10^{-3}
5wt%PEDOT @LNMO	13	0.5	0.179	0.179	7.14×10^{-3}

Table.S2. Rietveld Analysis of Pristine LNMO and 3wt%PEDOT@LNMO after 200 cycles

Samples	Lattice parameters			
	a/ \AA	V/ \AA^3	R _p (%)	R _w p(%)
Pristine LNMO before cycling	8.17	545.3	8.19	11.89
Pristine LNMO after 200 cycles	8.15	541.3	8.25	12.32
3wt%PEDOT@LNMO before cycling	8.17	545.3	8.17	11.83
3wt%PEDOT@LNMO after 200 cycles	8.167	544.7	8.15	11.54

Table.S3. measured EIS data on pristine LNMO and 3wt%PEDOT@LNMO after 200cycles

Samples	Before cycling		After 200 cycles	
	R _s (Ω)	R _{ct} (Ω)	R _s (Ω)	R _{ct} (Ω)
Pristine LNMO	1.849	72.82	4.811	226.59
3wt%PEDOT@LNMO	1.11	50.96	1.583	116.7

Table.S4. The results of ICP of Pristine LNMO and 3wt%PEDOT@LNMO after 200 cycles

samples	ICP results (mg/L)	Content of Mn(mg)	Content of LNMO (mg)	dissolution rate of Mn (%)
Pristine LNMO	1.274	0.0636	1.8	3.538
3wt%PEDOT@LNMO	0.438	0.0219	1.8	1.2