

UNIVERSITÉ
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AGENCE NATIONALE DE LA RECHERCHE
ANR

Structure-Electrochemistry relationships of $\text{LiNi}_x\text{Mn}_{2-x}\text{O}_4$ ($0 \leq x \leq 0.5$) spinel oxides

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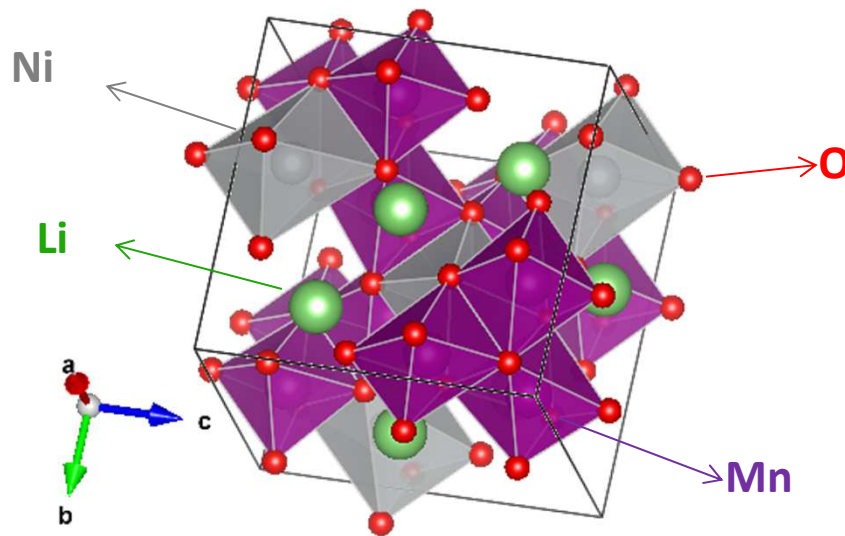


Ordered and Disordered structures

LiNi_{0.5}Mn_{1.5}O₄ cathode material

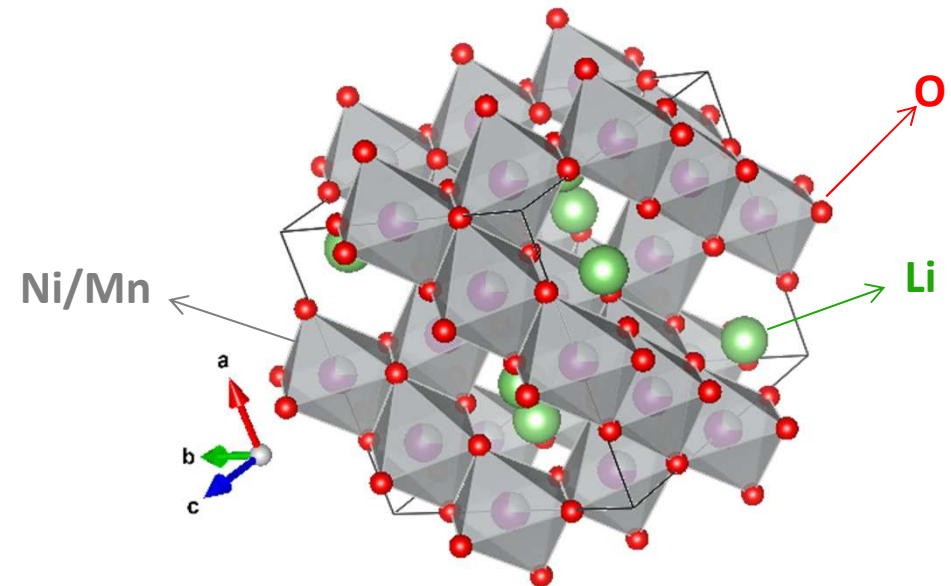
P 4₃ 3 2 Space Group
→ Ni/Mn Ordering

Ordered



F d -3 m Space Group
→ Ni/Mn random distribution

Disordered



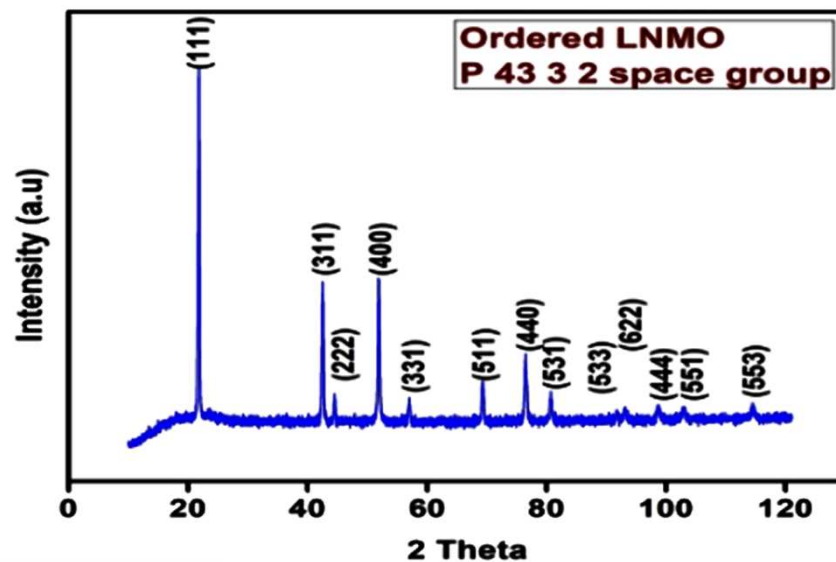
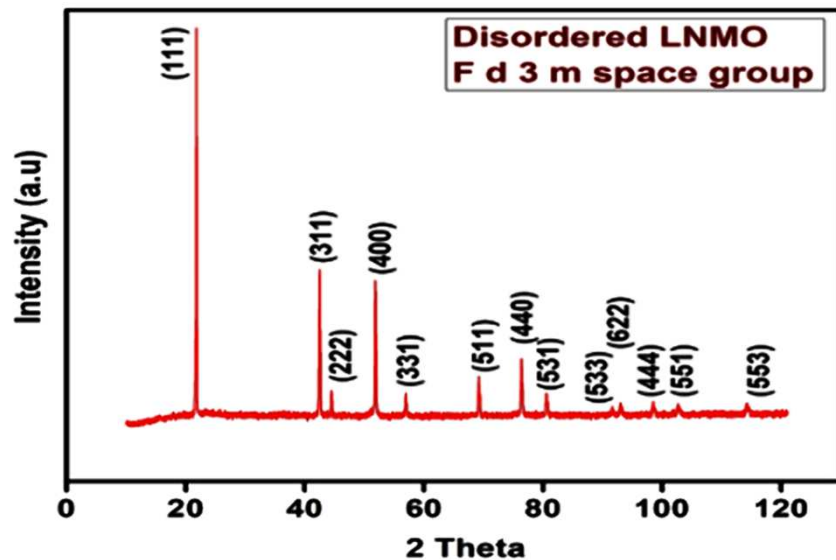
<u>Atom</u>	<u>Wyckoff position</u>
Li	8c
Mn	12d
Ni	4a
O1/ O2	8c/24e

<u>Atom</u>	<u>Wyckoff position</u>
Li	8a
Mn/Ni	16d
O	32e

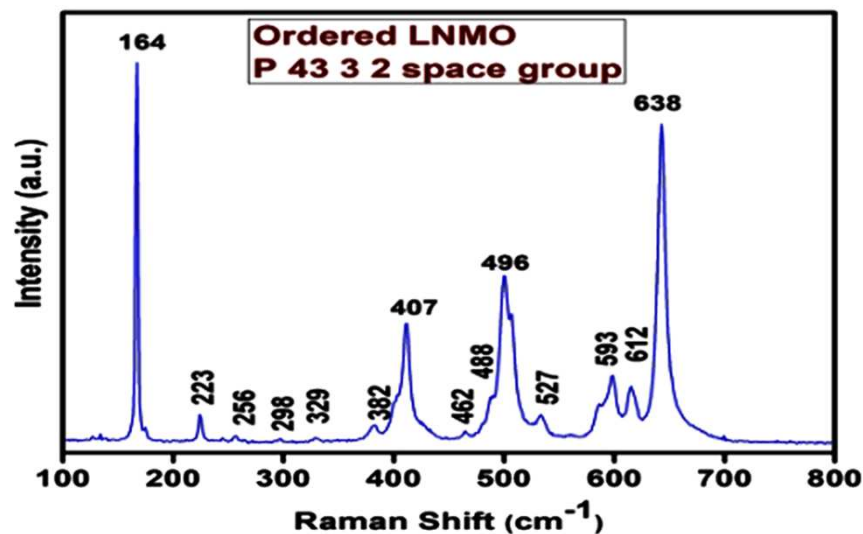
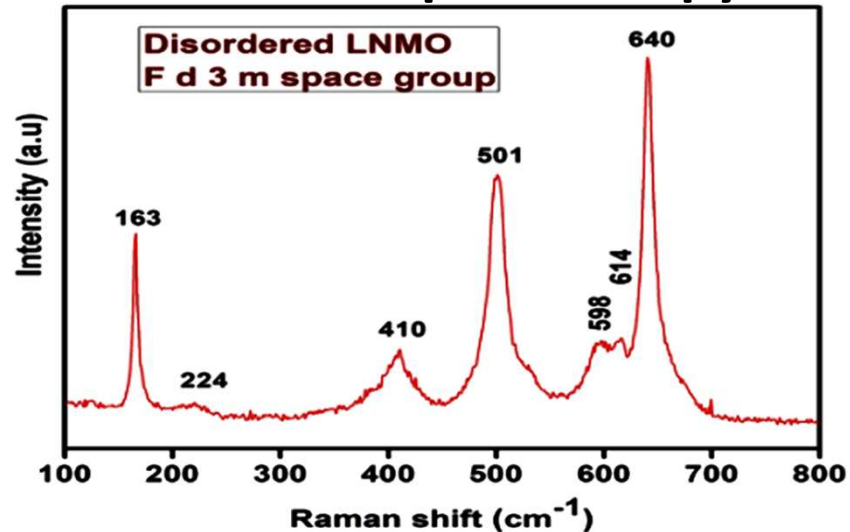


Order/Disorder experimental Evidence of $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$

XRD

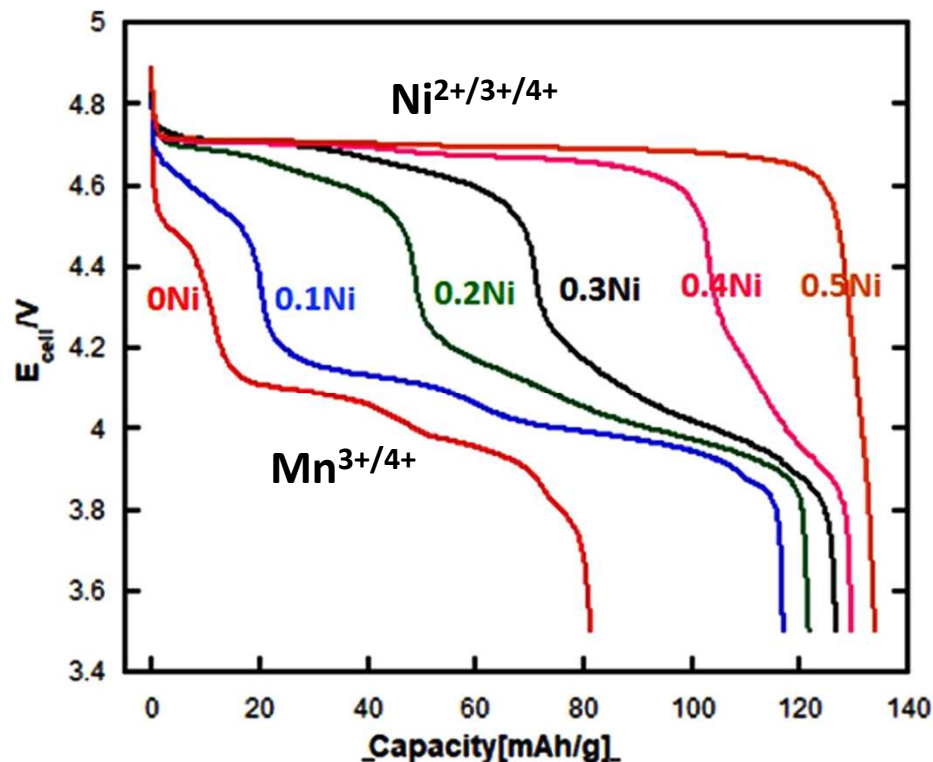


Raman spectroscopy

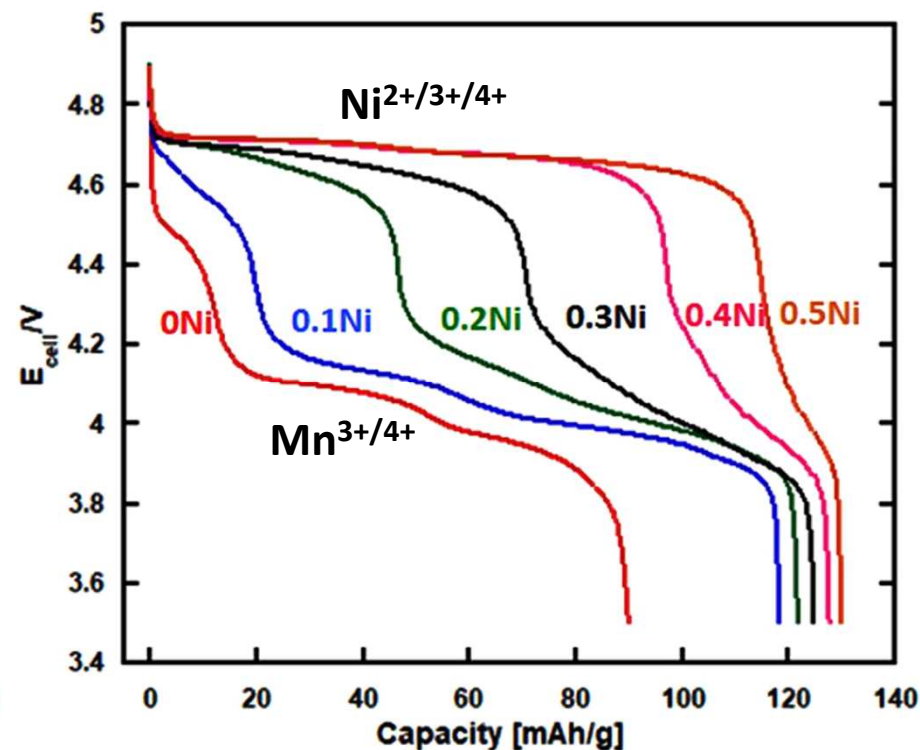


Discharge curves of $\text{LiNi}_x\text{Mn}_{2-x}\text{O}_4$ [$0 \leq x \leq 0.5$]

Synthesized at 700°C



Synthesized at 900°C



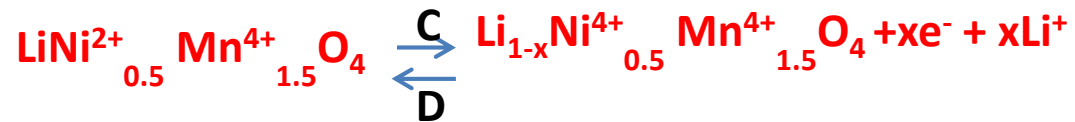
Overall increase in the discharge capacity and working potential with increase in Ni content

LNMO: Super P : Acetylene black: PTFE 80:7.5:7.5:5

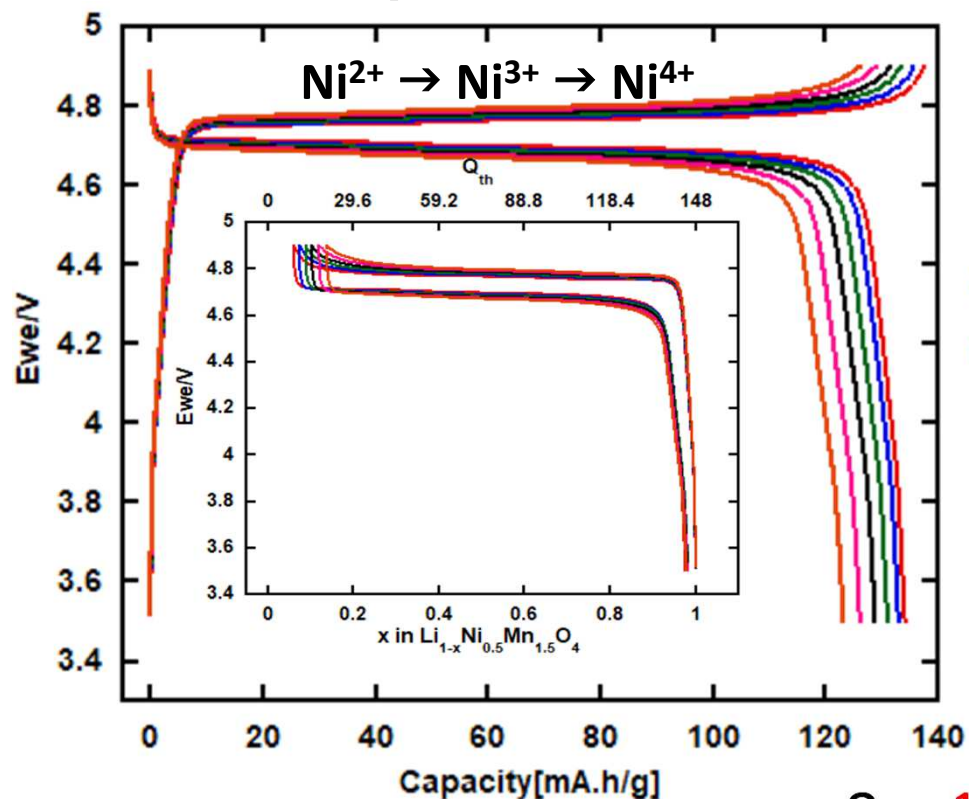
Electrolyte – 1M LiPF₆ EC:DMC 1:1; C-Rate – C/10; Potential window – 3.5V – 4.9V



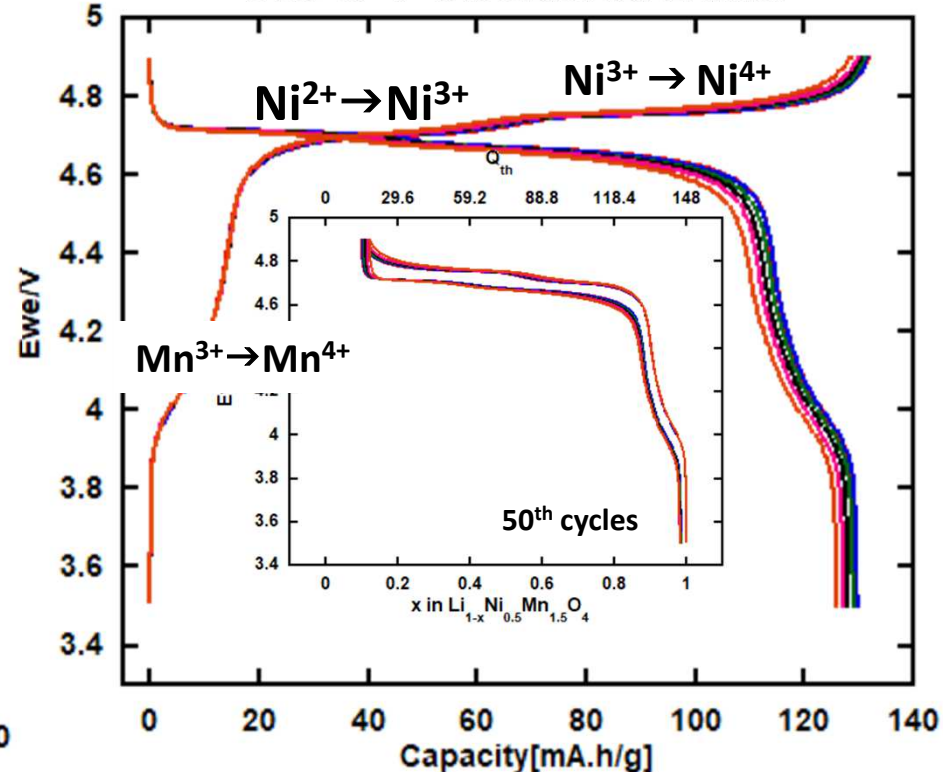
Galvanostatic measurements of $\text{LiNi}_{0.5}\text{Mn}_{1.5}\text{O}_4$



700°C → Ordered LNMO



900°C → Disordered LNMO



$Q_{\text{Th}} = 147 \text{ mAh/g}$

$Q_{\text{Discharge}}$ Ordered = 134 mAh/g

$Q_{\text{Discharge}}$ Disordered = 129 mAh/g

Operating potential – 4.7V Vs Li^+/Li

