

Accepted Manuscript

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PII: S1572-6657(17)30868-8
DOI: doi:[10.1016/j.jelechem.2017.11.071](https://doi.org/10.1016/j.jelechem.2017.11.071)
Reference: JEAC 3701

To appear in: *Journal of Electroanalytical Chemistry*

Received date: 4 September 2017
Revised date: 22 November 2017
Accepted date: 27 November 2017

Please cite this article as: Florencia Marchini, Federico J. Williams, Ernesto J. Calvo , Electrochemical impedance spectroscopy study of the $\text{Li}_x\text{Mn}_2\text{O}_4$ interface with natural brine. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. *Jeac*(2017), doi:[10.1016/j.jelechem.2017.11.071](https://doi.org/10.1016/j.jelechem.2017.11.071)

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ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY STUDY OF THE $\text{Li}_x\text{Mn}_2\text{O}_4$ INTERFACE WITH NATURAL BRINE

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The LiMn_2O_4 -Polypyrrole electrochemical cell has been shown to extract LiCl from natural brine at low voltage with high selectivity, low energy consumption ($5\text{-}10 \text{ Wh}\cdot\text{mol}^{-1}$) and good stability. The intercalation/de-intercalation of Li^+ ions in $\text{Li}_x\text{Mn}_2\text{O}_4$ ($0 \leq x \leq 1$) has been studied by electrochemical impedance spectroscopy (EIS) at different potentials and lithium ion concentrations using a modified Randles equivalent electrical circuit for the interface of $\text{Li}_x\text{Mn}_2\text{O}_4$ in natural brine from Salar de Olaroz (Jujuy, Argentina). The R_{CT} exhibits two minima at potentials which correspond to $x = 0.25$ and $x = 0.75$ (half filled adsorption sites) respectively and a linear lithium ion concentration dependence of $(\text{Li}^+)^{-0.5}$ consistent with a lithium ion transfer adsorption model proposed by Bruce.

Keywords: lithium, extraction, LiMn_2O_4 , impedance, brine

Footnote first page:

Dedicated to the memory of Professor Roger Parsons who in 1961 as a UNESCO Fellow during his three-month visit initiated the Electrochemistry Group at the University of Buenos Aires, School of Exact and Natural Sciences.

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