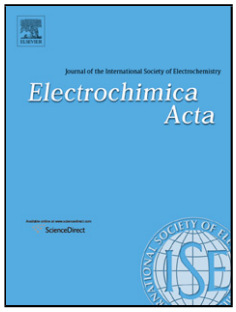

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PII: S0013-4686(16)30239-0
DOI: http://dx.doi.org/doi:10.1016/j.electacta.2016.01.212
Reference: EA 26594

To appear in: *Electrochimica Acta*

Received date: 1-11-2015
Revised date: 28-1-2016
Accepted date: 29-1-2016

Please cite this article as: Laura Coustan, Pierre Lannelongue, Paul Arcidiacono, Frédéric Favier, Faradaic contributions in the supercapacitive charge storage mechanisms of manganese dioxides, Electrochimica Acta http://dx.doi.org/10.1016/j.electacta.2016.01.212

Faradaic contributions in the supercapacitive charge storage mechanisms of manganese dioxides

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Abstract:

Electrode materials based on four different manganese dioxides, amorphous, birnessite, crytpomelane and spinel were fabricated and their electrochemical behaviors compared in two electrolytes, Li_2SO_4 and $(NMe_4)_2SO_4$. With respect to the structural characteristics of the various prepared MnO_2, these electrolytes can be differentiated by their cation size. Voltammetric studies showed that these electrode materials presented distinct capacitive behaviors depending on the electrolyte used. Modeling of the electrode capacitances measured at various scan rates allowed to discriminate the surface and material bulk contributions to the overall specific capacitance of the fabricated electrodes.

Keywords: manganese dioxide, cation size, electrolyte, surface capacitance, bulk capacitance

1. Introduction

Thanks to Faradaic contributions to their storage mechanism, metal oxides are the most studied pseudo-capacitive materials [1–4]. Nevertheless, they should address many technological and process specifications before being produced at the industrial-scale and