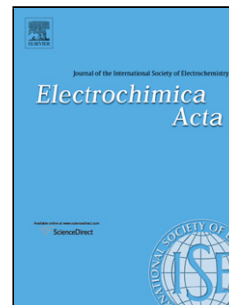


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Author: Laura Coustan Pierre Lannelongue Paul Arcidiacono
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Faradaic contributions in the supercapacitive charge storage mechanisms of manganese dioxides

Laura Coustan^{1,2}, Pierre Lannelongue^{1,2}, Paul Arcidiacono^{1,2} and Frédéric Favier^{1,2*}

1. Institut Charles Gerhardt Montpellier UMR 5235 CNRS, Université de Montpellier, Campus Triolet, cc1502, 34095 Montpellier cedex 05, France

2. Réseau sur le Stockage Electrochimique de l'Energie (RS2E), FR CNRS 3459, France

* fredf@univ-montp2.fr (Frédéric Favier)

Abstract:

Electrode materials based on four different manganese dioxides, amorphous, birnessite, cryptomelane and spinel were fabricated and their electrochemical behaviors compared in two electrolytes, Li_2SO_4 and $(\text{NMe}_4)_2\text{SO}_4$. 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

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