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Analysis of manganese dioxide electrochemical capacitors using synchrotron methods: in-situ analysis of electrodeposition.

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Manganese oxides (MnO2, MnOOH) are promising materials for electrochemical capacitors due to their low cost and toxicity, coupled with their attractive energy storage properties, and are hence well represented in the literature [1]. Thin films of MnO2 prepared by electrodeposition are capable of achieving high values for gravimetric specific capacitance (>2000 F/g) [2]. Material activity, as well as material morphology play an important role in determining the capacitive behaviour of a material [3]. Thus, it is important to understand the role the electrodeposition solution has on the resultant structure and morphology of the deposited manganese oxides.

In this poster, the in-situ application of three different synchrotron techniques to the electrodeposition of manganese oxides will be discussed. The beamlines utilised for the experiments described in this poster are powder diffraction, small angle x-ray scattering and x-ray absorption spectroscopy. In all cases, the electrodeposited manganese oxides have been prepared from a solution containing between 0.001 - 0.1 M MnSO4 and 0.01 – 1 M H2SO4.

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2. Andrew Cross, A.M., Ariana Cormie, Tony Hollenkamp, Scott Donne, Enhanced Manganese Dioxide Supercapacitor Electrodes Produced by Electrodeposition. Journal of Power Sources, 2011. 196: p. 7847 - 7853.
3. Conway, B.E., Electrochemical Supercapacitors: Scientific Fundamentals and Technological Applications. 1999, New York: Springer.

Keywords

manganese dioxide, electrochemical capacitors, energy materials, electrodeposition

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