Effect of Cobalt ions on Electrochemical Properties of sol – gel Birnessite $MnO_{1.84}$, 0.6 H_2O

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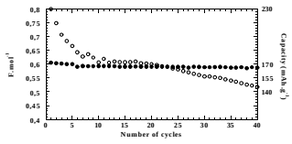

Fig.1. Evolution of the specific capacity as a function of the number of cycles for the birnessite and doped-birnessite compound

Keywords : Manganese oxide, lithium insertion, impedance measurements.

Low temperature techniques (such as sol – gel process and ionic exchange reaction in aqueous media) are successfully used to prepare lamellar manganese oxides.
Sol – gel process chemistry provides homogeneous mixing of reactants on the molecular level and can also be used to control shape, morphology and particle size in the resulting products.

Previous results obtained in our group have shown the interest of using the sol – gel method to get new and/or high performance cathodic materials especially in the case of V_2O_5 – based compounds and MnO_2 oxides [1,2]. The major problem in developing sol – gel processes for the synthesis of manganese oxides with near MnO_2 stoichiometry is the lack of suitable Mn(IV) molecular precursors in aqueous solution. An alternative consists in the use of redox reactions between fumaric acid and aqueous permanganate in order to get Mn(IV) and then the building of Mn – O – Mn bonds to form an oxide network through polycondensation reactions.

The sol – gel birnessite $MnO_{1.84}$, 0.6 H_2O is also obtained but its synthesis can be performed with the presence of cobalt ions during the reduction step. We show here that the resulting product exhibits improved electrochemical performances and in particular, a stabilization of the specific capacity (177 $mAh.g^{-1}$) during cycling [3] (Fig 1).

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[3] S. Franger, S. Bach, J. Farcy, J-P. Pereira-Ramos, and N. Baffier, *in preparation.*