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Effect of Pure and Ag-Doped Mno_2 Nanoparticles on the Li-Air Cathode Behaviour

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Extended Abstract

One of the most important aspects regarding the Li-air, organic electrolyte, rechargeable cell (Thapa et al., 2011) is that the oxygen reactions during charge and discharge do not need any expensive and limited availability of catalyst. On the other side no satisfying reaction promoter has been yet found. Many transition metals and transition metal oxides have been investigated, including Au, Pt, NiO, Fe_2O_3 and Fe_3O_4, in aprotic media (Débart et al., 2007), and IrO_2-SnO_2 mixtures in alkaline protic solvent (Locatelli et al., 2013 and Minguzzi et al., 2012). The most promising material, in terms of performances in both oxygen reduction (discharge) and evolution (charge) and costs, seems to be manganese dioxide, MnO_2. According to the literature, MnO_2 would ensure capacities comparable to those of platinum, letting higher capacity retention to be reached (Cheng and Scott, 2011) even in the presence of non-aqueous electrolytes, widely used to prevent Li decomposition. This latter effect can be due to the electrode surface potentials causing a rapid degradation of the electrolyte and leading to other discharge products (lithium alkyl carbonates or simply $LiCO_3$). In the present work, the electrocatalytic activity of different hydrothermal synthesized MnO_2, supported on ad hoc synthesized mesoporous carbon, is evaluated using an experimental lithium-air cell to prevent the electrolyte influence and possible limitations. Correlations between the physico-chemical characteristics of the materials employed to prepare the GDE and the electrical performances of the cell are drawn.

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