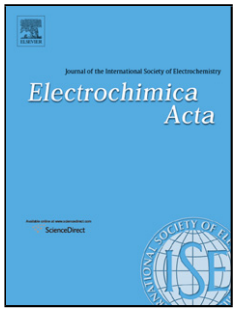

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MnO_2 as ink material for the fabrication of supercapacitor electrodes

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Abstract

With the objective of the formulation of ready-to-print stable water-based inks of supercapacitive MnO_2, selected surfactants have been used as reactants for the synthesis of manganese oxide powders. The presence of sodium dodecylsulfate (SDS), caffeic acid and Triton TX100 in the reaction medium drastically impacts on the characteristics of the resulting material at crystal and molecular levels, on particle shape and size, on the Mn oxidation state as well as on the electrochemical behavior of the corresponding electrodes. With caffeic acid and Triton TX100, resulting oxides are mixtures of amorphous MnO_2 and Mn_2O_3 with limited electrochemical performances. Showing, in contrast, strong similarities with birnessite-type MnO_2, surfactant-free powders and those prepared in presence of SDS, both show attractive electrochemical performances with capacitances up to 164 F/g for the latter. The excess of particle surface charges upon SDS adsorption is pointed out for a better stability of the corresponding ink formulation as well as for a better dispersibility of the powder at dry state, which result in a more homogeneous composite electrode.