



Symmetric Supercapacitors Employing MnO₂ And Polyaniline Composite

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ABSTRACT

Large area electrodes of MnO₂ + polyaniline (PANI) composites of several compositions are fabricated with high specific mass of the active materials. Laboratory scale symmetric capacitors consisting of two similar electrodes separated by absorbent glass mat soaked in aqueous Mg(NO₃)₂ electrolytes are assembled. The capacitor made with a composite of MnO₂+5 wt% PANI provides high capacitance and low equivalent series resistance. The results of long-cycle life test conducted for the capacitors suggest that the capacitance of MnO₂+5 wt% PANI capacitor is stable over 1000 charge-discharge cycles and the capacitance is greater than that of MnO₂ capacitor. Ac impedance data suggest that the charge-transfer resistance (R_{ct}) associated with Mn⁴⁺/Mn³⁺ redox process, which is noticeable at high frequency region is associated with build-up of pseudocapacitance, which is noticed at low frequency region. There is a gradual increase in R_{ct} during the initial stages of cycling and thereafter it remains unchanged. MnO₂+5 wt% PANI composite is found to be suitable for development of commercial capacitors.

Keywords: Manganese dioxide, Polyaniline, Composites, Supercapacitors, Ac impedance.
