



## **Symmetric Supercapacitors Employing MnO<sub>2</sub> And Polyaniline Composite**

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### **ABSTRACT**

*Large area electrodes of MnO<sub>2</sub> + 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(NO<sub>3</sub>)<sub>2</sub> electrolytes are assembled. The capacitor made with a composite of MnO<sub>2</sub>+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 MnO<sub>2</sub>+5 wt% PANI capacitor is stable over 1000 charge-discharge cycles and the capacitance is greater than that of MnO<sub>2</sub> capacitor. Ac impedance data suggest that the charge-transfer resistance (R<sub>ct</sub>) associated with Mn<sup>4+</sup>/Mn<sup>3+</sup> 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<sub>ct</sub> during the initial stages of cycling and thereafter it remains unchanged. MnO<sub>2</sub>+5 wt% PANI composite is found to be suitable for development of commercial capacitors.*

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

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