**IIIk05-003**

**Fast aging spectroscopy impedance analyses of carbon electrodes supercapacitors with organic electrolyte at 3.8V and 100°C**

Silva, L.S.(1); Casini, J.C.(2); Galego, E.(3); Faria, R.N.(3);
(1) IFRO; (2) IFSP; (3) IPEN-CNEN;

Carbon-based electrochemical supercapacitors are tight to a rigidly specification of maximum operating potential and temperature (label nominal ratings). Due the high conductivity, common electrolytes in these cells are tetraethylammonium tetrafluoroborate salt (NEt4BF4) in acetonitrile (ACN) or propylene carbonate (PC). Nevertheless, these highly volatile liquids are very sensitive to exciding nominal specifications of potential and temperature. The supercapacitor damage is caused by electrolyte decomposition at higher potentials and cell expansion with elevated temperature. Electrolyte decomposition products are very active and are most prone to react to the carbon electrode. This further causes aging of the electrochemical supercapacitor. In this investigation, the equivalent series resistances (ESR) of activated carbon-based electrodes of supercapacitors produced with organic electrolyte have been investigated using electrochemical impedance spectroscopy (EIS). Commercial supercapacitors have been submitted to a maximum potential of 3.8 V during cyclic voltammetry tests. Internal series resistances of the supercapacitors were measured using EIS at room temperature and at 100°C. Even with short period of time during cyclic voltammetry tests, the internal resistance increase substantially with operating temperature and also with a potential above the nominal ratings (2.75V). It has also been shown that the specific capacitance decreased in these extreme conditions causing fast aging even on short time interval.