

Electrochemical Supercapacitors: the Challenge of the Conducting Polymers

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Electrochemical Supercapacitors provide a positive answer to the market demand of high power energy-storage systems. Improvements of electrochemical supercapacitor performance require the lowering of their equivalent series resistance (ESR) for high specific power and the development of high specific capacitance electrode materials for high energy and with high cycling stability for long cycle-life. In this field research is mainly focusing on double layer activated carbons, with controlled surface area and pore size distribution.

Electronically conducting polymers (ECPs) based on conventional monomer units, such as the methylthiophene, are promising electrode materials for supercapacitors: i) they are materials of high specific capacitance because the doping process involve the entire polymer mass; ii) they are materials of high conductivity in the charged state; iii) their doping/undoping process is generally fast, so that devices with low ESR and high specific power are feasible. Being the cycling stability of polymethylthiophene (pMeT) sufficiently high to take this polymer into consideration for supercapacitor technology, as well as its capacitance and capacity, at least for a positive electrode (1,2), we have recently developed a new type of supercapacitor, a hybrid device with p-doped pMeT as positive electrode and activated carbon as negative (C//pMeT) (3).

This paper presents and discusses cyclability data of n/p-type polymer devices with both the positive and negative electrodes based on pMeT (pMeT//pMeT) and the results are compared with those obtained for C//pMeT hybrid supercapacitors.

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