

ELECTROCHEMICAL CHARACTERIZATION OF CHEMICALLY POLYTHIOPHENE DERIVATIVES-BASED ELECTROCHEMICAL CAPACITORS.

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Conducting polymers have been recently investigated for their potential applications as active electrode materials in electrochemical capacitors. Among these conducting polymers, polythiophene and its derivatives make up an interesting class of materials for electrochemical capacitors because they exhibit p- and n-doping redox processes which encompass a voltage range that can reach 3 V. Consequently, this enables the fabrication of 3 V-devices which allow much higher energy and power densities relative to capacitors based on only p-dopable polymers.

We have recently characterized both low and high band gap polythiophenes, prepared by electrochemical polymerization of the corresponding monomers or oligomers, as electrode materials for electrochemical supercapacitors (1-3). Although the electrochemical polymerization method is very convenient for laboratory studies, it might not be appropriate for large scale synthesis of polymers. Consequently, we have recently developed procedures for the chemical synthesis of polythiophene derivatives and have evaluated their performance in electrochemical capacitors (4).

In this paper, we present the electrochemical characterization of various chemically synthesized polythiophene derivatives. In addition, the galvanostatic charge/discharge of electrochemical capacitors assembled with these polymers as active electrode materials was also investigated.

1. F. Fusalba, N. El Mehdi, L. Breau and D. Bélanger, *Chem. Mater.*, 11 (1999) 2743.
2. F. Fusalba, H.A. Ho, L. Breau and D. Bélanger, *Chem. Mater.*, 12 (2000) 2581.
3. E. Naudin, N. El Mehdi, L. Breau and D. Bélanger, *Chem. Mater.*, 13 (2001) 634.
4. P. Soudan, P. Lucas, H.A. Ho, D. Jobin, L. Breau and D. Bélanger, *J. Mater. Chem.*, 11 (2001) 773.