Ultracapacitors made with Hybrid conducting polymer–clay exfoliated nanocomposites

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Abstract
Ultracapacitors form exfoliated nanocomposites of poly(3,4-ethylenedioxythiophene) (PEDOT), and montmorillonite (MMT), have been fabricated, and have been characterized by electrochemical and macroscopic methods, found to present very good electrical properties (e.g. the specific capacitance), evidencing the favorable effect of the clay, and the thinness of the film.

Keywords: Conducting polymer, nanocopmposite, ultracapcitor.

1. Introduction

Exfoliated nanocomposites of poly(3,4-ethylenedioxythiophene) (PEDOT), and montmorillonite (MMT) have been prepared by anodic polymerization, concentrations of clay ranging from 5% w/w to 50% w/w in the polymerization medium [1]. Types I (symmetric configuration) and II (asymmetric configuration, **Fig. 1**) ultracapacitors have been fabricated using nanometric and micrometric films of PEDOT and PEDOT–MMT, and its properties (charge storage, specific capacitance, surface morphology, etc.) have been characterized by electrochemical and macroscopic methods, and compared with those of pristine PEDOT [2].

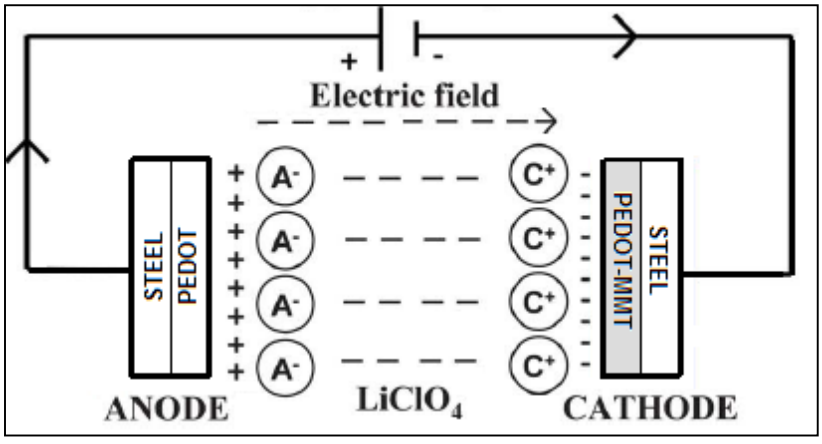

Figure 1. *Scheme of asymmetric capacitor PEDOT-MMT (Type II).*

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Both nanometric and micrometric type II ultracapacitors, have been found to present the better properties (e.g. the specific capacitance for nanometric and micrometric devices present a value of 429 and 116 F g^{-1}, respectively), evidencing the favorable effect of the clay, and the thinness of the film.

2. References

1. D.Aradilla et al., *J. Mater. Chem.* **2012**, *22*, 13110.
2. D.Aradilla, F. Estrany, C. Alemán, C. *J. Phys. Chem. C* **2011**, *115*, 8430.

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