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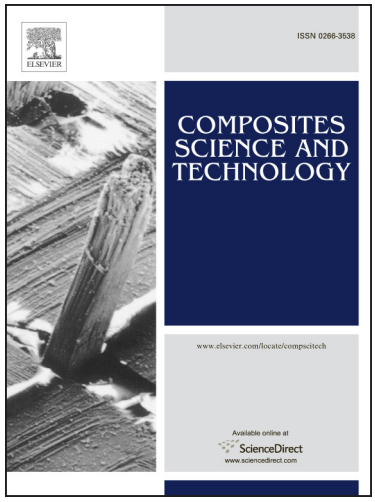

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ACCEPTED MANUSCRIPT

Cellulose/graphite/carbon fibres composite electrodes for Li-ion batteries

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Abstract

Cellulose fibres and an easy aqueous filtration process are used as binder and sheet forming technique, respectively, for the elaboration of mixed graphite (GP) - carbon fibres (CF) composite electrodes for Li-ion batteries. The screening of GP and CF mass fraction in the electrodes showed that the presence of two conducting phases has a synergistic effect on the electrode conductivity when GP and CF percolation networks are simultaneously present. A conductivity peak at 950 S m^{-1} was attained for GP and CF volume fractions of 13 and 6 %, respectively, corresponding to the percolation threshold of each individual phase. Cellulose/CF electrodes display moderate specific capacity of 200 mAh g^{-1} and a good specific capacity retention at high current rate, whereas cellulose GP electrodes demonstrate high specific capacity of about 310 mAh g^{-1} and a low specific capacity retention at high current rate which is ascribed to the high binder content, i.e. 20%, and low electron conductivity of 100 S m^{-1}. The use of CF/GP blends as active materials allows obtaining electrodes with high electron conductivity and specific capacity retention with CF:GP weight ratios ranging between 1:1 and 1:2.

Keywords: A. Fibres, A. Functional composites, A. Short fibres composites, B. Electrical properties, B. Synergism, Lithium battery.

1. Introduction

Over the last decade, ever increasing environmental constrains and forecasts for a pervasive diffusion of Li-ion batteries before 2020 [1],[2] motivated the development of new materials and processes for the

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