



4th International Seminar
Advances in Hydrogen Energy Technologies:
Opportunities and Challenges in a Hydrogen Economy

November 10th - 11th 2011
Viana do Castelo - Portugal
Book of Abstracts



Development of new organic electroactive materials for rechargeable batteries

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Keywords: *organic electroactive materials, rechargeable batteries, polyimide*

Abstract

The need for a clean and sustainable energy supply in the transportation sector have prompted electric vehicles as one of the options to reduce fossil fuel dependency and greenhouse gases emissions. Furthermore, electric vehicles are seen as enablers of the storage capacity of electric grids. In this context, the reasonable energy density and cyclability reached by lithium-ion batteries based on inorganic cathodes have placed them in considerable advantage regarding energy conversion and storage [1, 2]. For higher energy density, lower cost and more environmentally acceptable batteries research efforts are presently focus on organic-based electrodes as a new approach to conventional inorganic cathodes [3].

In this work, we carried out the development of a derivative of polyimide (PI) for use as electrochemically active cathode material in rechargeable lithium batteries. Even though the application of polyimide as electrode material is scarcely found due to its insulating character, its aromatic imide group can be electrochemically oxidized and reduced in a reversible manner [4,5]. This paper will present the studies on the synthesis and chemical characterization of a polyimide derivative and its evaluation as cathode organic polymer after electrochemical characterization. Test half-cell testing and battery constitution are being planned. The use of polyimide derivatives is considered promising because of the potential increase in specific discharge capacity, not flammability, excellent thermal stability and high mechanical strength. Furthermore since the polyimide is hydrolysable, its use can also be considered environmentally friendly.

Acknowledgments: This work was partially funded by the FAI – REIVE Project / Smart Vehicle to Grid.

References

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