

## **Effect of Additives to Electrolyte and Electrodes for Increasing Efficiency Li-Ion Batteries**

Elena Shembel<sup>1\*</sup>, Irina Maksuta<sup>1</sup>, Volodymyr Redko<sup>1</sup>,  
Dayal Meshri<sup>2</sup>, Ludmila Neduzko<sup>1</sup>, Volodymyr Maslov<sup>1</sup>,  
Vasiliy Pisny<sup>1</sup>

<sup>1</sup>Enerize Corporation, 4956 Rothschild Dr., Coral Springs,  
Florida 33067, USA [eshembel@enerize.com](mailto:eshembel@enerize.com),  
[www.enerize.com](http://www.enerize.com)

<sup>2</sup>Advance Research Chemicals Inc., 1110 W.Keystone  
Ave., Catoosa, OK 74015, USA  
<http://www.fluoridearc.com/>

The goal of the presented work was to develop the additives to non-aqueous electrolytes and electrodes with the goal to increase efficiency and stability during cycling of Li-ion batteries and investigate the effects of these additives.

Special attention was paid to system with cathode based on  $\text{LiMn}_2\text{O}_4$  spinel. The  $\text{LiMn}_2\text{O}_4$  spinel was synthesized using the proprietary technology developed by the authors of the paper. The  $\text{Mn}_2\text{O}_4$  spinel was synthesized using high bulk density chemical  $\text{MnO}_2$  as initial material. This initial material  $\text{MnO}_2$  was also developed by the authors of the paper.

This manganese oxide spinel has high tap density, high conductivity and stability during cycling. Higher packed density of the electrode material benefits the enhancement of volumetric energy density. As a result, the cathode based on the developed  $\text{LiMn}_2\text{O}_4$  spinel has higher energy in relation to volume as compared to other electrode materials.

Conductivity of the Enerize spinel  $\text{LiMn}_2\text{O}_4$  is three times higher as compared with a conductivity of  $\text{LiCoO}_2$  and 40% higher as compared with  $\text{LiMn}_2\text{O}_4$  from the market.

During our presentation the results of the evaluation and investigation of the positive influence of the additives to non-aqueous electrolytes and nano-composite additives to electrode materials powder on the properties Li –  $\text{LiMn}_2\text{O}_4$  system will be presented.