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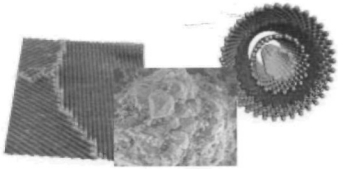

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BOOK OF ABSTRACTS

web-site: http://www.phys.univ.kiev.ua/material/conference

P1.12. THE APPLICATION OF POROUS CARBON MATERIAL IN HYBRID CAPACITOR SYSTEMS

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The conception of hybrid capacitor (GC) presents by itself the mixed battery-capacitor electrochemical system. Two different mechanisms of charge accumulation (a charge of double electric layer and an electrochemical reaction) have been realized in this system. The use of nonpolarized electrode increases a voltage of single element and multiplies the working voltage interval of supercapacitor. A specific capacity grows too, as in an equivalent scheme the series capacitor is absent.

A hybrid capacitor formed by us consists of lithium spinel $LiMn_2O_4$ as a positive electrode and porous carbon material (PCM) as negative ones. 1M water solution of Li_2SO_4 was an electrolyte. The synthesis of anode material on the basis of lithium-manganese spinel of $LiMn_2O_4$ composition was realized accordingly a traditional ceramic technology from manganese dioxide and lithium hydroxide [1]. PCM got from raw material of vegetable origin by the method of hydrothermal carbonization at 900°C and following thermal activation at the temperature of 400°C for 180 min was used as cathode material. It is set experimentally [2] that the specific energy parameters of the capacitor systems on the basis of PCM depend in great extent on a temperature and time of duration of temperature treatment.

A cell of HC shows reversibility with the sloping profile of voltage at mean value ~ 1.5 V and provides a maximal specific capacity of 24 mA·h/g, with the assumption of overall weight of the activated electrode material (including positive and negative electrodes). Maximal working voltage of 1.8 V is higher than in any known water system.

Thus, HC's parameters are optimized, laboratory standards of HC, specific energy of which exceeds in 3 times the one of symmetric capacitor on the basis of PCM in 1M Li_2SO_4, are made.

[1] Y.D. Tretyakov, N.N. Oleynikov, V.A. Hranik. Physical and chemical bases of thermal treatment of spinels. – M.: Publishing house of Moscow University, 1973. – PP. 158-174.

[2] B.K. Ostafiychuk, B.I. Rachiy, I.M. Budzyulyak, O.D. Mahometa. The obtaining and electrical properties of nanoporous carbon from coconut shell // Physics and chemistry of solid state. – 2008. – V. 9, N. 1. – PP. 77-80.