Energy Characteristics of Supercapacitors Based on Chemically Modified Carbon

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One of the modern trends of development of rechargeable energy sources is the study of creation Supercapacitors (SC), that operate on the principle of charge/discharge of the electrical double layer (DEL) on polarized electrodes with a large specific surface area. The value of specific capacity IC depends on the type of electrolyte, structure and condition of the developed surface of the electrode material.

The effect of carbonization temperature of raw materials of plant origin on specific capacitance characteristics of the obtained nanoporous carbon (NC), that is used to manufacture SC electrodes, was investigated. Dried apricot pits were used as feedstock. To study the effect of carbonization temperature on the structure and energy characteristics of NC, the feedstock was carbonized in the temperature range of 300 to 900 °C with the interval of 100 °C. Carbonized carbon was activated with potassium hydroxide in different proportions. Samples were numerated according to carbonization temperature and percentage of chemical activator (eg, C63 – material, carbonated at 600 °C and mixed at a ratio of 1: 3 with KOH). Thus, seven series of samples C3 ... C9 were received.

According to galvanostatic research data dependence of capacitance value of NC on discharge current is obtained (Fig. 1). The received results indirectly suggest that these technological methods allow gaining NC, in which a pore system with optimal ratio between the volume fraction transport and operating pores is formed.

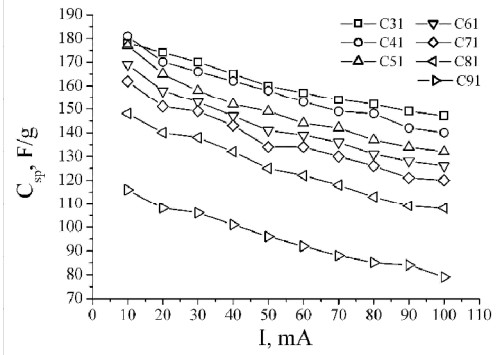

Fig. 1 – Dependence of the NC specific capacity on discharge current.

It is established that heat treatment and optimizing of feedstock and KOH enables to provide a carbon material with specific capacity of 150 to 195 F/g at the discharge current of 50 mA, and power surge of generated on its basis SC does not exceed 18 % of the maximum voltage at the discharge current of 100 mA.