Nanocomposites and nanomaterials

Chemically activated carbon as electrode for supercapacitor

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In the work the results of electrochemical studies of nanoporous carbon (NC) as electrode material for electrochemical capacitors (EC) has been shown. NC is obtained from raw materials of plant origin by carbonization and activation with potassium hydroxide. For this the dried apricot seeds were milled to a fraction with size 0.25-1 mm and carbonated at 250-350 ºC, after mixed with potassium hydroxide and water in the weight ratio: 1:1, 1:2, 1:3 and 1:4. The resulting mixture was thoroughly stirred for 1-2 hours and dried in an incubator at 90ºC up to constant weight. The dried material was placed in a furnace and heated in an argon atmosphere at 850-920ºC at the heating rate of 10ºC/min for 20 min. After cooling, the resulting material was washed in 15% aqueous HCl up to neutral pH and dried at 90ºC up to constant weight.

Samples are named according to the ratio of carbon and KOH. For example, C32 is the material carbonized at 300ºC and mixed with potassium hydroxide in the ratio 1:2. EC electrodes were formed by pressing of NC and conductive additive in the form of lamel on the nickel grid. Formed electrodes were placed in two electrode cell with type size "2525", which after the pouring with 30% aqueous KOH as the electrolyte was sealed.

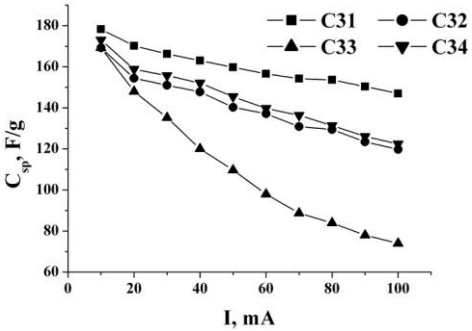

Fig. 1. The dependence of specific capacity of the NC on discharge current

Specific capacity characteristics of obtained NC were studied by galvanostatic cycling at a discharge current of 10-100 mA (Fig. 1).

Based on the analysis of the results, we revealed that there is an optimal ratio between the content of KOH and carbonated carbon material in chemical activation, which is equal to 1:1 and the specific capacity of the obtained NC is 180 F/g.