NANOPOROUS CARBON MATERIALS FOR SUPERCAPACITORS

Vervikishko D.E.,* Kochanova S.A., Dolzhenko A.V., Shkolnikov E.I.

JIHT RAS, Moscow, Russia
**vitkina-darya@yandex.ru*

Carbon materials are widely used as electrode structures for supercapacitors. The reason for this is a number of unique properties of carbon, such as high corrosion resistance, sufficient electronic conductivity, high temperature stability, the ability to adjust specific surface values and other parameters of the porous structure during synthesis. In addition, the variety of forms of carbon materials also allows more flexible approach to the choice of supercapacitor electrode materials. The properties of the carbon electrode are influenced by the properties of the carbon electrode such as: the type of feedstock, its dispersion and elemental composition, prepyrolysis and activation regimes, modification after activation, etc. Various materials can be used as activation raw materials: polymers, petroleum pitch, fossil coal, plant biomass (peat, wood and its components, nutshells), etc. An important condition from the technical and economic standpoint is the low cost, availability and uniformity of raw materials. To effectively form a double electrical layer in supercapacitors, it is necessary to provide a highly developed surface of electrode materials. That is why one of the most common electrode materials is activated carbon with a large specific surface area. An important role is played by the state of the surface of the carbon material (for example, the presence of surface C-O groups, the contact angle, and other physicochemical characteristics).

This work is devoted to the development and investigation of highly efficient activated carbons from wood. Extensive work has been done to determine the optimum modes of synthesis of these carbon materials to achieve high specific electrochemical characteristics of supercapacitors with aqueous and organic electrolytes. It is shown that the developed materials have high resource stability. More than 1 200 000 charge-discharge cycles of a supercapacitor with an electrolyte of 1M tetraethylammonium tetrafluoroborate have been achieved. The nanoporous structure of activated coals has been studied, hypotheses about the influence of the parameters of the porous structure on the specific electrochemical characteristics have been made.

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