RESEARCH OF THE EFFECT OF THE CONDITIONS OF SYNTHESIS OF CARBON MATERIAL FROM RICE HUSK ON THE ELECTROCHEMICAL PROPERTIES OF THE SUPERCONDENSATOR ELECTRODES

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The results of the study of the influence of methods of rice husk carbonization (CRH) with subsequent activation on the electrochemical properties of the supercapacitor electrodes are presented.

The parameters of the pore size distribution in the nanoporous structure and the specific surface greatly influence the capacity and kinetics of the charge-discharge characteristics of the supercapacitor. To increase the specific surface area, the CRH is subjected to an activation process. To obtain activated carbon from CRH, physical and chemical activation was investigated. The obtained samples were examined on a scanning electron microscope. The specific surface area was studied by the BET method. Measurements of the electrochemical characteristics of the electrodes were carried out using a two-electrode cell in an alkaline electrolyte using a galvanostat-potentiostat. The specific capacitance was calculated from cyclic voltammetry and galvanostatic charge-discharge curves.

Physical activation was carried out at a temperature of 900 °C with a steam-gas mixture consisting of water vapor and carbon dioxide fed into the reactor. It was established that the carbon material obtained during physical activation does not have sufficient specific surface area 900 m^2/g and porosity necessary 0.39 cm^3/g for the effective use of a supercapacitor as an electrode. The highest gravimetric capacity of the supercapacitor based on them has low values, not exceeding 85 F/g.

Thermochemical activation of CRH was carried out at a temperature of 850 °C in an inert gas, pre-mixed with potassium hydroxide powder. Under these conditions, a carbon material is formed with a specific surface area of up to 3200 m^2/g, with a specific pore volume of 1.1-1.4 cm^3/g. In this case, the gravimetric capacity of the electrode material varies from 187 to 254 F/g at a sweep speed of 160 to 1 mV/s, respectively.