

Electrochemical properties of carbon material obtained from walnuts



Ivanichok O.M., Ivanichok N.Ya., Ivaniv I.I., Kolkovskyi P.I., Rachiy B.I.,
Vasyl Stefanyk Precarpathian National University 57 Shevchenko Str.,
Ivano-Frankivsk, Ukraine.
E-mail: iomm@ukr.net,

Nanoporous carbon (NPC) is a promising material for perfectly polarized electrodes of electrochemical energy sources. In this work, carbon materials were obtained by the method of thermal carbonization of walnut shells at a temperature of 800 °C (Fig.1). In the process of obtaining the raw material with a fraction of 5-15 mm was poured into an autoclave, placed in an oven and heated to a given temperature at a rate of 5 °C/min [1].



Fig. 1. Schematic illustration of the synthesis of NPC from walnut shell

The dependence of the specific capacitance of the obtained NPC on the value of the charge / discharge current in 33% KOH was studied by the method of galvanostatic cycling. Moreover, the discharge specific capacity and internal resistance of the NPC were determined based on the obtained chronopotentiograms. It is determined that the primary carbonization of plant biomass at a temperature of 800 °C makes it possible to obtain NPC with a specific capacity of up to 97-121 F/g in the range of operating currents of 5-100 mA at a maximum charge / discharge voltage of 1 V (Fig.2). A sharp drop in voltage at a charge / discharge current indicates the presence of ohmic resistance in the NPC / electrolyte electrochemical system. The maximum operating discharge current is up to 100 mA for all samples, since with its further increase, the voltage drop during discharge exceeds 20% of the maximum voltage [2]. However, it should be noted that the value of the charge / discharge current has practically no effect on the internal resistance of the electrochemical system, the value of which is 1-1.5 Ohm (Fig.2) .

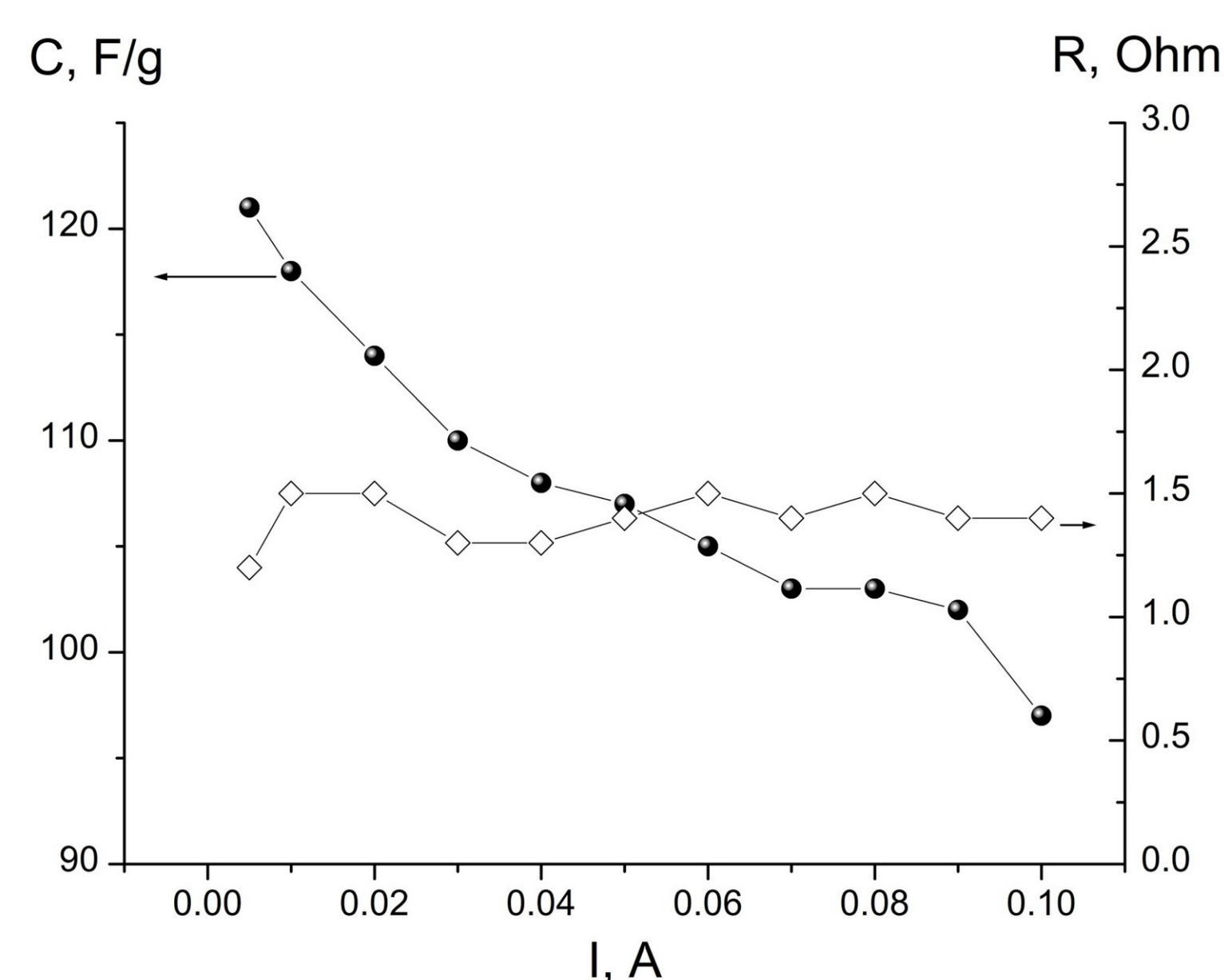


Fig.2. Dependence of the specific capacitance of the NPC sample on the discharge current

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