

## ELECTRICAL CONDUCTIVITY STUDY OF POROUS CARBON COMPOSITE DERIVED FROM RICE HUSK

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### Introduction

Annual manufacture of various types and brands of activated carbons (ACs) is equal to millions of tons, wherein the main consumers are petrochemical, food, mining and pharmaceutical industries. Other advanced application of the activated carbons is to produce on their basis the electrode materials for energy storage systems, mainly for electrochemical supercapacitors<sup>1</sup> as well as for capacitive deionization technology utilized for a desalination of water.

The selection of carbon precursor is based on the available quantity, value, and cost required for imparting this material the appropriate functional features. Since the rice is the biggest food source for most humankind, the wide application of the rice husk (RH) might have a great practical importance. Moreover the huge amounts of this waste by product accumulate on the rice mills without any efficient utilization and recycling.

The decrease in density resulting from more stringent activation conditions reduces the volumetric capacity which is most important for practical applications. For these reasons the present work represents the high yield method for preparation of ACs from RH with predominant microporosity combining moderate proportion of mesopores providing facilitated charge propagation at high scan rates.

### Materials and Methods

The cleaned and dried RH was derived from local farms of Almaty region, Kazakhstan, and subjected for carbonization at 500 °C ±10 °C in the nitrogen atmosphere. Carbonized RH was mixed with potassium hydroxide by use the weight proportion of 1:2 (precursor to KOH) and activated at different temperatures under nitrogen atmosphere. The resulting mixture was subjected to washing by distilled water until the neutral pH. Carbons obtained on the basis of RH by use of chemical activation are described by the index "RH-CA", the number in the titles corresponds to the temperature of isothermal treatment. The index of "RH(P)-CA" corresponds to the AC derived by use of preliminary grinded RH.

The nitrogen adsorption isotherms were determined with an Autosorb-1 (Quantachrome instruments, UK) in the range of relative pressures from 0.005 to 0.991 realized at -196 °C.

For evaluating the electrochemical performance in supercapacitors of carbons prepared from RH the composite electrodes were used. The electrochemical investigations were conducted by using the multichannel potentiostat/galvanostat VMP-3 (BioLogic Instruments, France).