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Activated rice husk derived porous carbon with improved electrochemical performance for supercapacitor electrodes

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The world's extensive use of a fossil fuel increased drastically in the last decades causing not only a sharp drop in the world reserves but also resultant environmental concerns. Due to these problems the world's energy system is shifting from a fossil fuel driven economy to renewable energy sources. Therefore, with a growing share of this energy sources in the electricity grid also an increased amount of storage facilities will be needed. Due to their long cycle life and fast charge-discharge processes, supercapacitors are one of the most promising candidates for energy storage. The main challenges faced by supercapacitors include low energy density, production cost and high self-discharge. One of the most intensive approaches of overcoming the obstacle of low energy density and high production cost is by developing new cost-effective methods for producing electrode materials. Various methods to produce porous carbon from different kinds of raw materials have been reported, a focus in our research is on the utilization of renewable rice husk. Activated Rice Husk (ARH) derived porous carbon with few layer graphene-nanosheets were synthesized via the carbonization of rice husk followed by chemical KOH-activation process in a stainless steel double walled reactorfor fabrication of a low-cost supercapacitors with high-energy density. The ARH with graphitic structure has a high surface area of ~4200 m^2/g. The ARH derived graphene-nanosheet electrodes show a specific capacitance of 223 F/g at a scan rate of 10 mV/sec, along with an excellent cyclic stability. The observed good electrochemical energy-storage performance of the ARH derived graphene-nanosheet electrodes is due to the synergetic effect of their huge electrochemically active surface area and an improved electrical conductivity.

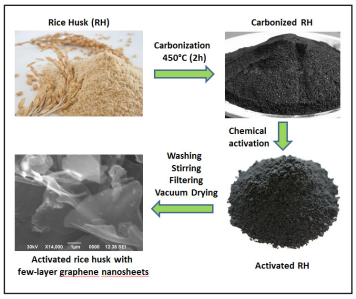

Figure-1: The synthesis process of ARH derived porous carbon with few layer graphene-nanosheet.

Biography

Nikolay G Prikhodko has experience in the field of synthesis of carbon nanostructures, research of their properties and applications. His latest developments were aimed at obtaining carbon nanostructures from wastes of plant raw materials, in particular, rice husks.

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