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Mesoporous carbon electrode materials for supercapacitors

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Electrochemical double-layer capacitors have tremendous potential as high-energy and high-power sources for using in the low weight hybrid systems. Commercial applications for such devices include uninterruptible power applications, telecommunications, and public transportation. Electrochemical double layer capacitors, commonly called "supercapacitors", are intermediate systems that bridge the power/energy gap between traditional dielectric capacitors (high power) and batteries (high energy). Carbon-based supercapacitors have been largely investigated because of their low-cost, high cycle life and high capacitance. New microporous and mesoporous carbon electrode materials have been synthesized by template synthesis followed by carbonization and activation derived from phenol-formaldehyde or resorcin-formaldehyde resins, in which potassium hydroxide acts as both the catalyst of polymerization and the chemical activation reagent. The obtained carbons were characterized by a specific surface area of 1000-2000 m^2/g. The aim of the work was to investigate the relationship between the specific capacitance and specific surface area in a series of materials prepared from different organic precursors. The electrochemical characteristics of electrode materials were investigated in a symmetrical two-electrode cell using an impedance spectroscopy, voltammetry in both potentiodynamic and galvanostatic modes. It was shown that the value of C for the materials under study strongly depended on the organic precursor and the type of electrolyte. The capacity diminishes at transition from organic to aqueous electrolytes and decreases in a series: 1M $LiClO_4$ in acetonitrile > 1M H_2SO_4 > 6M KOH > 1M Li_2SO_4.

Biography

Yulia G Mateyshina has her own experience in the synthesis and study of electrochemical properties, electrode materials for lithium-ion batteries and supercapacitors. She has worked on the study of the electrode materials and solid electrolytes for medium electrochemical devices. She has succeeded in creating an all solid-state supercapacitor.

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