Nanoporous wood-waste based carbons for supercapacitors electrodes

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Study of nanoporous activated carbons is of high scientific and practical importance due to constantly increasing area of their application. Interest to carbon materials (CM) can be explained by the variety of their structures with drastically different chemical and physical properties. These properties of the CM depend on precursor type and properties of thermal and chemical treatment. Choice of plant biomass as a precursor allows synthesizing nanoporous activated carbons from the wide variety of raw materials in different conditions using wood chips, cellulose and various lignins, lignocellulosics, nut shells, peat, etc.

The aim of this work was to synthesize nanoporous CM on the base of charcoal precursor for application as electrode materials in electric double layer capacitors (supercapacitors). Sodium and potassium hydroxides are the effective agents for coal and biomass treatment and were used in this study to form a nanoporous structure. Alkali activation consists of four main stages: 1) impregnation or mixing of precursor with alkali (proportion 1-5 g/g); 2) heating up to activation temperature (600-800^{o}C); 3) isothermal treatment (1-3 h); 4) cooling and demineralization with consequent washing up to neutral pH.

Isothermal nitrogen sorption, Raman and EPR spectrometry and immersion calorimetry were used to study synthesized nanoporous activated carbons structural properties. It was found that in the case of charcoal precursor sodium hydroxide exhibits higher activity in activated carbon porous structure formation than potassium hydroxide. In the case of coals sodium hydroxide is more active [1].

References:

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