Nanostructured surface

Soft Fluorinated activated carbons: synthesis and electrochemical properties as supercapacitor electrode

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Activated carbons, Norit® 830W, Petrodarco® 4x10, and BAU-A were subject of Soft Fluorination with Forane® and R-125. Fluorinated carbons were characterized by nitrogen adsorption/desorption, MAS ^{19}F NMR, XPS, ATR spectroscopy, and TG analysis. Adsorption/desorption studies clarify the effect of fluorination temperature on the microporosity of resulted carbon materials. The fluorine content was determined by means of ion-selective potentiometric titration. Up to 5 mmol/g of fluorine, approx. 10 mass%, was found in the resulted fluorinated carbons of 4x10@Forane series. The Forane® and R-125 treated carbons have the surface that functionalized with a number of fluorine-containing functionalities, e.g. $-CF_3$, $=CF_2$ groups. Their nature and content depend on the fluorination agent and the preparation conditions used. The samples, treated at 400, 500 and 600 °C were tested as a supercapacitor electrode in a composition with 5% PVDF in 30% KOH water solution. Being referred to the specific surface area, energetic performance of the fluorinated surface, at stated conditions, increases by 40% (for Norit® 830W series), if addressed to that of the initial 830W. Samples have a good thermal and reasonable chemical stability. We believe that the cause for the electrode behavior improvement reasoned from the contraction of the double electric layer (DEL). Perhaps, this observation is caused the stronger adhesion of PVDF to the fluorinated activated carbon, and also an increase of dielectric constant ε of DEL.

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