

Impedance spectroscopy study of a catechol-modified activated carbon electrode as active material in electrochemical capacitor

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R�sum� en anglais	Modified activated carbon (Norit S-50) electrodes with electrochemical double layer (EDL) capacitance and redox capacitance contributions to the electric charge storage were tested in 1 M H₂SO₄ to quantify the benefit and the limitation of the surface redox reactions on the electrochemical performances of the resulting pseudo-capacitive materials. The electrochemical performances of an electrochemically anodized carbon electrode and a catechol-modified carbon electrode, which make use both EDL capacitance of the porous structure of the carbon and redox capacitance, were compared to the performances obtained for the pristine carbon. Nitrogen gas adsorption measurements have been used for studying the impact of the grafting on the BET surface area, pore size distribution, pore volume and average pore diameter. The electrochemical behavior of carbon materials was studied by cyclic voltammetry and electrochemical impedance spectroscopy (EIS). The EIS data were discussed by using a complex capacitance model that allows defining the characteristic time constant, the global capacitance and the frequency at which the maximum charge stored is reached. The EIS measurements were achieved at different dc potential values where a redox activity occurs and the evolution of the capacitance and the capacitive relaxation time with the electrode potential are presented. Realistic galvanostatic charge/discharge measurements performed at different current rates corroborate the results obtained by impedance.
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Liens

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- [3] [http://okina.univ-angers.fr/publications?f\[author\]=3533](http://okina.univ-angers.fr/publications?f[author]=3533)
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