

Electrochemical Properties of Composites C/Ni(OH)₂ and C/Ni(OH)₂/MoO₃

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Nickel hydroxide and molybdenum trioxide are cheap alternative materials exhibiting capacitive behavior similar to ruthenium oxide, which is too expensive for commercial use. To increase the conductivity of these materials we used nanoporous carbon, which is a good conductive additive and can solve the problem of nanoparticles coagulation when the electrode material is nanodispersed.

Fig. 1 shows the cyclic voltammograms of nanocomposite electrodes C/Ni(OH)₂ and C/Ni(OH)₂/MoO₃ at the scanning speed of 1 mV/s. There are two redox peaks responsible for pseudocapacity: one peak - anode (positive current density) during the oxidation of Ni²⁺ to Ni³⁺, and the second - cathode (negative current density) in the reverse process. These peaks are fast reversible redox processes occurring at the interface of Ni(OH)₂ and Ni(OH)₂/MoO₃ from one side and the electrolyte from the other. This shows that the capacitance characteristics are mainly regulated by faradic reactions, not only the capacity of the electrical double layer.

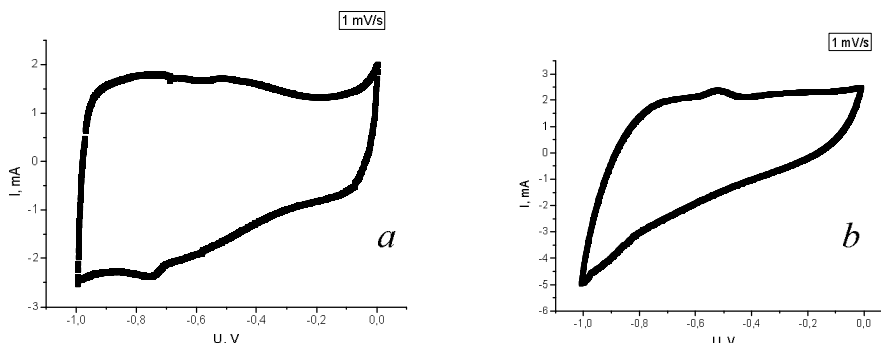


Fig. 1. Cyclic voltammograms of electrochemical cell formed based on the composites: *a*) C/Ni(OH)₂, *b*) C/Ni(OH)₂/MoO₃ at the scanning speed of 1 mV/s

Voltage dependence of the cell current is not linear during the charge/discharge, due to the redox processes that occur at the cathode during charge and discharge.

Analysis of the charge/discharge curves of electrochemical cells formed on the basis of the composites shows that the cell, which electrode formed from the composite C/Ni(OH)₂/MoO₃, specific capacity reaches a maximum value at the current of 1 mA; this value is reduced more than twice with the current increasing up to 5 mA. For composite C/Ni(OH)₂ specific capacity is practically unchanged with the current increasing.