IIk32-007

Microstructural and electrochemical studies of HDDR-graphene supercapacitors electrodes in KOH electrolyte

Galdino, G.S.(1); Silva, D.V.(1); Cruz, P.D.(1); Casini, J.S.(2); Sakata, S.K.(3); Faria, R.N.(1);
Instituto de Pesquisas Energéticas e Nucleares(1); Instituto de Pesquisas Energéticas e Nucleares(2); Instituto de Pesquisas Energéticas e Nucleares(3); Instituto Federal de Educação, Ciência e Tecnologia de São Paulo(4); Instituto de Pesquisas Energéticas e Nucleares(5); Instituto de Pesquisas Energéticas e Nucleares(6);

In the past, the hydrogenation disproportionation desorption and recombination (HDDR) process has only been used to produced rare earth transition metal polymer bonded permanent magnets with outstanding performance. Recently, however, it has been shown that the HDDR process (850oC) can be successfully employed to produce reduced graphene oxide for electrochemical supercapacitors. In the present work, the electrochemical characteristics of HDDR-graphene supercapacitors have been compared to those obtained with chemically reduced commercial graphene oxide. Lower HDDR processing temperatures (200-600oC) have been used in this study for a comparison with previous investigations. The equivalent series and parallel resistances (EPR and ESR) and specific capacitance (Cs) of HDDR-graphene supercapacitors electrodes have been investigated using cyclic voltammetry. Room temperature specific capacitances calculated from cyclic voltammetry curves at scan rates of 2 mVs-1 reached ~160 Fg-1 in 1 molL-1 KOH electrolyte. Internal series resistances of the HDDR-graphene electrodes were measured using the galvanostatic curves also at room temperature. The microstructures of the electrode material have been investigated using scanning electron microscopy (SEM) and chemical microanalyses employing energy dispersive X-ray analysis (EDX).