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Influence o separator thickness on the performance of electric double layer supercapacitors in aqueous electrolyte

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The effects of the separator thickness (?) upon the equivalent series and resistances (ESR) and specific capacitances (Cs) of supercapacitors electrodes have been investigated using commercially available porous filter paper (?=150 ?m, pores size=7.5 ?m, 80 gm-2). Commercial activated carbon electrodes immersed in 1molL-1 KOH electrolyte (25oC) have been employed in this study. The specific capacitances were calculated from cyclic voltammetry curves at room temperature employing various scan rates (5, 10, 15 and 30 mVs-1). Internal series resistances of the supercapacitors were measured using the galvanostatic charge discharge curves also at room temperature. A maximum of 28 separators (?=4200 ?m) have been employed in this investigation. It has been shown that the ESR increases substantially with separator thickness (from 3.1 to 7.9 ?cm2). The specific capacitance decreased somewhat with increasing separator thickness and scan rates (from 64 to 52 Fg-1; at 5 mVs-1). The microstructures of the electrode material have been investigated using scanning electron microscopy (SEM) and chemical microanalyses employing energy dispersive X-ray analysis (EDX). A compositional and morphological evaluation of these electrodes showed a very homogeneous microstructure.