Efficiency of Supercapacitor with $CaTiO_3$-filled Polysulfone Separators

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Abstract

The constantly increasing demand for electric energy in the present world results in the need for energy storage such as batteries, capacitors and supercapacitors. Supercapacitors are durable and can charge electricity faster and keep electric charge longer. In this study, electrodes for supercapacitors were made from aluminum foils coated with carbon nanotube film and separated by electrolyte solution and a separator. A separator could prevent short circuit but allow ions to pass through, and consequently increased storage layers of electric charge. The separators used in this study were made from polysulfone containing $CaTiO_3$ 0.5, 1.0 and 2.0 wt% with Perovskite properties, high dielectric constant, electrical resistivity and energy density. After that, they were built in coin-cell form. It was found from the study that the addition of 2.0 wt% $CaTiO_3$, the largest proportion of all samples, provided a maximum specific energy at 4.03 mWh/g and a maximum specific capacitance at 4.64 F/g. accounting for 2.17-time higher than that of polysulfone without $CaTiO_3$. The functional group analysis of PSF and $CaTiO_3$ separators showed that the increasing of $CaTiO_3$ in the PSF separators, the 2958 cm^{-1} in C-H stretch peaks reduced, and consequently specific energy and specific capacitance were higher. Thus, supercapacitors with $CaTiO_3$-filled polysulfone separators are suitable for improving efficiency of supercapacitors in energy storage from electrical supply.

Keywords: Supercapacitor, $CaTiO_3$, Polysulfone, Separators