CONSTRUCTION OF SUPERCAPACITORS BASED ON ACTIVATED CARBON

A PROJECT REPORT PRESENTED BY

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Supercapacitors have emerged with the potential to enable major advances in energy storage. Supercapacitors are governed by the same fundamental parameters as in conventional capacitors, but utilize higher surface area electrodes and thinner dielectrics to achieve greater capacitances. This allows for energy densities greater than those of conventional capacitors and power densities greater than those of batteries. As a result, supercapacitors may become an attractive power solution for an increasing number of applications. This project focuses on the different types of supercapacitors, the relevant quantitative modeling areas, and the future of supercapacitor research and development.

The general design of an electric double layer capacitor comprises a liquid or solid electrolyte sandwiched between two activated carbon blocking electrodes. The supercapacitor constructed and tested was based on activated carbon (PW5 6/16) with high surface area and LiCl aqueous electrolyte. Electrodes were prepared by applying a mixture of fine activated carbon powder, PVDF binder and carbon black on aluminum foil. An electrically insulating thin paper soaked in the electrolytic solution was used as the separator between two electrodes.

The characteristics of the constructed supercapacitor was investigated using impedance analyzer, cyclic voltammetry, and constant charge discharge methods. The specific capacitance of the supercapacitor wind obtained by the complex impedance measurements was 10 F g^{-1} at 20 Hz. The capacitance obtained by charge discharge measurements was 0.3 F where the efficiency of the supercapacitor was 69%.