

ABSTRACT

Supercapacitor is an energy storage device that has a capacitance value that is much larger than ordinary capacitors. Supercapacitors consist of the main components, namely electrodes and electrolytes. In this study, activated carbon electrodes were fabricated using the electrophoretic deposition method to produce electrodes with good wettability properties by varying the binder, namely PTFE and PTFE/HEC. In addition, an analysis of the influence of morphology and electrical properties on the specific capacitance was conducted. Electrode fabrication was carried out using NMP and NMP/water solvents at a constant voltage of 15 V for 20 minutes. There are four characterizations used in this study, namely characterization wettability with Contact Angle, characterization Scanning Electron Microscopy (SEM) to determine the morphology of the resulting electrode, characterization Four Point Probe to determine electrical properties (resistivity) and Cyclic Voltammetry characterization to determine the electrochemical properties and capacitance values of activated carbon electrodes. The characterization of wettability showed that the best properties were wettability shown in the composition of the binder PTFE/HEC 1:2 with a contact angle of 22.8°. Best result in the characterization Scanning Electron Microscopy (SEM) are indicated by a composition binder PTFE/ HEC 1: 0 for not much binder PTFE / HEC which closes the pores of the electrode. For the characterization of the Four Point Probe, the best resistivity results are shown in the composition binder PTFE/HEC = 1:2 of 17.9 Ω /cm. Based on the results of the characterization Cyclic Voltammetry, a maximum capacitance of 31 F/g was obtained with a composition binder PTFE/HEC = 1:0 with a good surface morphology characterized by not many binders covering the electrode pores. At electrodes with various compositions binder PTFE/HEC, it shows that resistivity and wettability are not always directly proportional to capacitance, but good electrode surface morphology has the most dominant contribution to the specific capacitance value.

Keywords: Electrophoretic deposition, wettability, Scanning Electron Microscopy, Four Point Probe, Cyclic Voltammetry, specific capacitance.