THE EFFECT OF MOLE COMPARISON AND VARIATION OF SOLVENT ON THE SYNTHESIS OF MNO2/CARBON COMPOSITE ELECTRODES (MNO2/C) FROM CORN COB ON SUPERCAPACITOR CAPACITANCE VALUE

by Dyah Purwaningsih, Hari Sutrisno, Sri Atun

ABSTRACT

Supercapacitors are a promising electrochemical energy storage system. Supercapacitors have a long life time, short charging time and high power density. The high power density of supercapacitors is caused by the large surface area of ??the electrode material. One electrode material is activated carbon because it has a large surface area. Natural materials such as corn cobs, cassava husks, sugar cane bagasse and rice husks have the potential to become active carbon because they contain quite high levels of lignin and cellulose. MnO_2 was chosen because of its abundance, wide voltage range, and low toxicity.
In general, this research aims to: (1) Determine the characteristics of the MnO_2/C composite material from corncob as a supercapacitor electrode synthesized using the solvothermal method and (2) Determine the effect of variations in solvent and MnO_2/C composition ratio formulation during synthesis on the supercapacitor capacitance value using solvothermal method. The synthesis results were characterized using XRD and SEM-EDX instruments to determine their physical characteristics. Next, the MnO_2/C composite was tested for capacitance for supercapacitor electrode applications.
Based on the research results that have been obtained, it can be concluded that: (1) The characteristics of the MnO_2/C composite material from corn cobs as a supercapacitor electrode which was synthesized using the solvothermal method, namely by XRD analysis shows a carbon peak (at 2θ around 26° and 43°) and MnO_2 peaks in each composite. SEM-EDX analysis shows that the composite with the highest capacitance has a less even distribution of MnO_2 on the carbon surface with a MnO_2 particle size of less than 1 micrometer. Analysis of crystal size and capacitance shows that composite 1 with a MnO_2:C ratio of 1:2 has the smallest crystal size, namely 5.8710 nm and has the largest capacitance value, namely 133.2155 mF/g. The application of composite electrode 1 is as a memory backup; (2) The MnO_2/C composite formulation from corn cob which produces the highest capacitance value as a supercapacitor electrode synthesized using the solvothermal method is a MnO_2:C ratio of 1:2. This comparison is the formulation that produces the highest capacitance value because this comparison produces the largest capacitance value compared to the other comparisons, namely 133.2155 mF/g. Through the data obtained, it can be concluded that the higher the percentage of MnO_2 in the MnO_2/C composite, the higher the capacitance value.

Kata Kunci: *corn cob, MnO2/C composite, supercapacitor electrode*