ABSTRACT

A sulfur-based battery cathode is chosen because sulfur is a material with high energy density. However, its insulating nature necessitates combining sulfur with CNTs and activated carbon to improve its conductivity. This study aims to obtain the morphology and electrochemical properties of a sulfur-based battery cathode combined with AC, MWCNT, PVDF with DMF solvent through a synthesis process. In this research procedure, the doctor blade technique was used to evenly distribute the synthesized liquid onto a Cu foil substrate, followed by drying in an oven to obtain a dry sample. Subsequently, the dry sample was characterized using SEM-EDS, Cyclic Voltammetry (CV), and Electrochemical Impedance Spectroscopy (EIS) methods using Palm Sense 4 or PSTRACE5 software. The SEM-EDS test results show a complex structure on the cathode with various specific functions, with carbon being the dominant component. The specific capacitance values obtained through CV testing at Na_2SO_4 electrolyte concentrations of 0,1; 0,3; 0,5; 0,8; and 1 M are 20,53 (F/g); 37,29 (F/g); 50,38 (F/g); 50,93 (F/g); and 37,56 (F/g), respectively. The conductivity values obtained through EIS testing after fitting the impedance curves for the same five variations are 0,07 (S/cm); 0,14 (S/cm); 0,43 (S/cm); 4,46 (S/cm); and 0,13 (S/cm), respectively. From the CV and EIS tests, it was found that the optimum Na_2SO_4 concentration is 0,8 M, with the highest specific capacitance and conductivity values.

Keywords: battery cathode, sulfur, specific capacitance, conductivity.