ABSTRACT

Lithium-ion batteries are one of the most widely used energy sources because they have a large energy storage capacity, light weight, and high charging efficiency. One of the important components that determines the performance and safety of the battery is the separator, which serves as a barrier between the anode and the cathode while allowing the transport of ions through their pores. Conventional separator materials such as Polyvinylidene Fluoride (PVDF) are widely used due to their good mechanical properties and chemical stability, but the disadvantages of high crystallinity, hydrophobic properties, and low ionic conductivity limit their use. To overcome this, PVDF modification was carried out with the addition of Eugenol -N,N'Methylene Bis Acrylamide Sulfonate (PE-MBAS) and Graphene Oxide (GO) Copolymers. GO is synthesized by Hummer's method, while PE-MBAS is obtained through eugenol modification with MBA which is then sulfonated. PVDF/PE-MBAS/GO membranes are made using the solvent-casting method with GO mass variations. Characterization was carried out through morphological analysis (FE-SEM), functional group (FTIR), measurement of thickness, solubility, porosity, hydrophilicity, degree of swelling, and biodegradability. The results showed that the synthesis yield of PE-MBA, PE-MBAS, and GO was 97.96%, 93.20%, and 91.50%, respectively, with a molecular weight of PE-MBA of 13,731 g/mol and PE-MBAS of 21,226 g/mol. Variations in GO mass have a significant effect on the properties of the membrane. Membranes with the addition of 100% GO provide the most optimal results so that it shows the potential for more effective separator performance with a porosity of 54.51%, a thickness of 0.04 mm, a degree of swelling of 69.17%, a homogeneous GO distribution, and a biodegradability of 53.33%. Conversely, the addition of excess GO (150%) causes particle agglomeration that decreases membrane performance.

Keywords: *Lithium-ion battery, separator, PVDF, PE-MBAS, dan GO.*