A study of roundabout sustainability using traffic simulation - a case study at Ayer Hitam signalised intersection

ABSTRACT

As lithium battery technology improves, it becomes more important to have solid polymer electrolyte dividers that work better. The objective of this study is to enhance the efficiency of solid polymer electrolyte separators in lithium batteries. This research aims to expand the limits of innovation in hybrid separator development by utilizing empty palm fruit bunches (OPFEB) as a plentiful source of cellulose acetate. This approach enhances ion transfer by increasing the number of pores in the separator. However, there are challenges to achieving the desired levels of optimal ionic conductivity. In order to address these constraints, this study presents a novel Al2O3-PAA inert ceramic oxide coating treatment that is applied to the separator by a spin coating technique. An electron microscope was utilized to observe the pore structure of the separator. Additionally, the separator underwent physical, mechanical, thermal, and cyclic voltammetry tests. The findings of this research indicate a significant increase in the physical properties, particularly the porosity and mechanical strength. The thermal shrinkage of the Al2O3-PAA coated separator is below 10% when exposed to a temperature of 140 oC for 30 minutes. The Cyclic Voltammetry test results demonstrate a pronounced loop curve, indicating an improvement in the ionic conductivity of the Al2O3-PAA coated separator. The findings of this study provide a method to enhance the efficiency of separator performance at high temperatures while maintaining safety and long battery life.