

A study of the structural and electrochemical properties of Li_3PO_4 -mmt-pvdf composites for solid electrolytes

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Abstrak

Batteries on the market today still use liquid-type electrolytes, which can result in safety issues caused by electrolyte leakage. Therefore, studies that search for solid-state electrolytes are important for resolving these issues. In this research, a composite of lithium phosphate-montmorillonite-polyvinylidene fluoride (Li_3PO_4 -MMT-PVDF) has been characterized with the aim of detecting the electrochemical performance of Li_3PO_4 with the addition of MMT. Li_3PO_4 samples were prepared through a solid-state reaction, which was then mixed with MMT, which had a composition ranging from 5 wt% to 20 wt%, and 1 wt% PVDF as a binder. This characterization was conducted with structural, morphological, and electrochemical aspects. The structural test showed that the X-ray diffraction (XRD) pattern was dominated by Li_3PO_4 peaks and MMT aluminosilicates. The electrochemical characterization indicated that the conductivity value of the composites was greater than that of Li_3PO_4 . The highest conductivity was achieved with a 15 wt% MMT addition, with a dielectric-constant value of 74.9 at a frequency of 10 kHz.