Improving Interfacial Problems between the Cathode and Solid-State Electrolyte by Coating ETPTA-PEG onto the Surface of $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$

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In recent years, the rapid development of the electric vehicle industry has led to the requirement of Li-ion batteries (LIBs) with a higher energy density and better safety. Therefore, solid-state lithium batteries with the above advantages have attracted a lot of attention. However, solving the interfacial problem between cathodes and the solid-state electrolyte has become a major challenge in the practical application of solid-state lithium-ion batteries. In this article, ETPTA (trimethylolpropane ethoxylate triacrylate)-PEG (poly(ethylene glycol)) is introduced onto the surface of $\text{LiNi}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}\text{O}_2$ cathode materials by ultraviolet irradiation. TEM and FTIR analyses reflect the existence of the composite coating layer. Electrochemical tests reveal that the coated material has better cycle stability (capacity retention remains 84% after 100 cycles), lower interfacial impedance and higher rate capabilities (34 mA h g⁻¹ at 2 C). These results reflect the fact that the coating layer plays a significant role in improving the interfacial contact between the cathode and solid-state electrolyte and suppressing surface side reactions.

Keywords: Ni-rich cathode materials, interfacial problem, surface modification

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