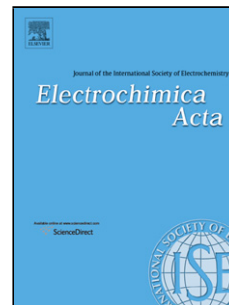


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Study on the stability of $\text{Li}_2\text{MnSiO}_4$ cathode material in different electrolyte systems for Li-ion batteries

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Abstract

This study reports on the thorough investigation into the interaction between nanosized carbon-coated $\text{Li}_2\text{MnSiO}_4$ and various electrolytes, which has revealed significant changes of the active material after soaking in the electrolyte. Apart from the standard electrolyte salt lithium hexafluorophosphate (LiPF_6), lithium bis(trifluoromethanesulfonyl)imide (LiTFSI) and the F-free salt lithium bis-oxalatoborate (LiBOB) were used for soaking tests and compared in terms of corrosion power with $\text{Li}_2\text{MnSiO}_4$. Carbon-coated $\text{Li}_2\text{MnSiO}_4$ samples were obtained by solid-state synthesis and stored in contact with the electrolyte. The aged samples were fully characterized by means of several analytical techniques (XRD, XPS, SEM, ATR-FTIR). The results show that $\text{Li}_2\text{MnSiO}_4$ decomposes in LiPF_6 -based electrolyte at high temperatures, due to the formation of HF, which causes corrosion of the material and dissolution of Mn. No degradation was observed after soaking in the LiBOB -based electrolyte. The corrosion of the active material in standard electrolyte system, together with irreversible structural changes upon Li electrochemical extraction, are considered as the main reasons for the poor capacity retention upon cycling of the $\text{Li}_2\text{MnSiO}_4$ -based cathode.

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