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研究论文

PEO-$LiClO_4$-ZSM5复合聚合物电解质 I. 电化学研究

席靖宇，马晓梅，崔孟忠，唐小真*

(上海交通大学化学化工学院 上海 200240)

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摘要 首次以“择形”分子筛ZSM5为填料, 通过溶液浇铸法制得PEO-$LiClO_4$-ZSM5全固态复合聚合物电解质(CPE)膜. 交流阻抗实验表明ZSM5的引入可以显著地提高CPE的离子电导率. 利用交流阻抗-稳态电流相结合的方法对CPE的锂离子迁移数进行了测定, 结果表明掺入ZSM5后锂离子迁移数明显升高. ZSM5的含量为10%时, CPE同时具有最高离子电导率1.4×10^{-5} S•cm^{-1}(25 ℃)和最大锂离子迁移数0.353. PEO-$LiClO_4$-ZSM5/Li电极界面稳定性实验表明PEO-$LiClO_4$-ZSM5复合聚合物电解质在全固态锂离子电池领域具有良好的应用前景.

关键词 复合聚合物电解质 ZSM-5 离子电导率 锂离子迁移数 界面稳定性

分类号

PEO-$LiClO_4$-ZSM5 Composite Polymer Electrolyte I. Electrochemical Study

XI Jing-Yu, MA Xiao-Mei, CUI Meng-Zhong, TANG Xiao-Zhen*

(*School of Chemistry and Chemical Technology, Shanghai Jiao Tong University, Shanghai 200240*)

Abstract A novel class of polyethylene oxide (PEO)-based composite polymer electrolyte (CPE) by using shape-selective molecular sieves ZSM5 as filler were obtained by solvent casting method. The effects of ZSM5 on the electrochemical properties of the PEO-$LiClO_4$-ZSM5, such as ionic conductivity, lithium ion transference number and interfacial stability with lithium electrode were studied by electrochemical AC impedance spectroscopy and steady-state current method. The experiment results showed that the addition of ZSM5 could improve the lithium ion transference number and enhance the ionic conductivity of PEO-$LiClO_4$ at the same time. The highest room temperature ionic conductivity of 1.4×10^{-5} S•cm^{-1} and lithium ion transference number of 0.353 were recorded when the content of ZSM5 was up to 10%. The good compatibility with the lithium electrode ensured the use of PEO-$LiClO_4$-ZSM5 as the electrolyte materials for all solid-state rechargeable lithium ion batteries.

Key words composite polymer electrolyte ZSM-5 ionic conductivity lithium ion transference number interfacial stability

DOI:

通讯作者 唐小真 xtang@sjtu.edu.cn