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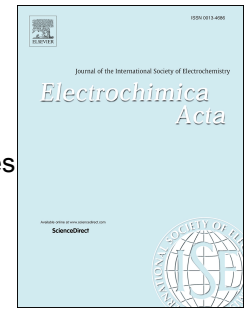

Charge distributions in poly(ethylene oxide)-based electrolytes for lithium-ion batteries

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Charge distributions in poly(ethylene oxide)-based electrolytes for lithium-ion batteries

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Abstract

The understanding of the formation and movement of charges inside solid polymer electrolytes is a critical point of the research for the development of better lithium-ion batteries (LIBs). In order to facilitate the understanding of the charge distributions, the Kelvin probe force microscopy with a reliable statistical data analysis approach has been used. As poly(ethylene oxide) (PEO) is a material used as an electrolyte in LIBs, the PEO and its salt compound with lithium perchlorate ($LiClO_4$) were investigated with this approach. The transient formation and movement of internal potential and simultaneously the charge distribution were investigated with respect to time under biased and unbiased conditions.

Keywords: charge distribution, solid polymer electrolyte, Kelvin probe force microscopy, interface effects, poly(ethylene oxide)

1. Introduction

The demand and necessity of electrical energy is growing day by day. In order to use electricity efficiently, the development of low-cost, safe and highly efficient energy storage devices is a very attractive subject of the research nowadays. An often used energy storage device in our regular life is the lithium-ion battery (LIB). One of the most critical component in the development of safe and efficient LIBs is the electrolyte separating the electrodes. As most of the LIBs have a liquid electrolyte, they are suffering from the safety issue such as