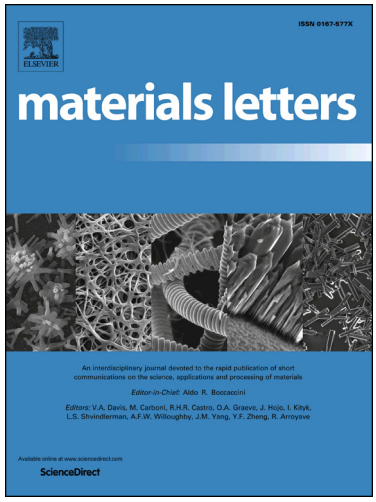
Accepted Manuscript



Synergistic Effect of Nano-Ceria Dispersion on Improvement of Li^+ Ion Conductivity in Polymer Nanocomposite Electrolytes

Saumya R. Mohapatra, Manjula G. Nair, A.K. Thakur

PII: S0167-577X(18)30465-8
DOI: https://doi.org/10.1016/j.matlet.2018.03.101
Reference: MLBLUE 24062

To appear in: *Materials Letters*

Received Date: 15 February 2018
Revised Date: 14 March 2018
Accepted Date: 17 March 2018

Please cite this article as: S.R. Mohapatra, M.G. Nair, A.K. Thakur, Synergistic Effect of Nano-Ceria Dispersion on Improvement of Li^+ Ion Conductivity in Polymer Nanocomposite Electrolytes, *Materials Letters* (2018), doi: https://doi.org/10.1016/j.matlet.2018.03.101

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Synergistic Effect of Nano-Ceria Dispersion on Improvement of Li^+ Ion Conductivity in Polymer Nanocomposite Electrolytes

Saumya R. Mohapatra[a*], Manjula G. Nair[a], A. K. Thakur[b*]

[a]*Solid State Ionics Laboratory, Department of Physics, National Institute of Technology Silchar Silchar - 788010, Assam, India.*
[b]*Department of Physics, Indian Institute of Technology Patna, India.*

E-mail: saumya@phy.nits.ac.in
akt@phy.iitp.ac.in

Abstract

In the present work, we report a polymer-nanocomposite electrolyte (PNCE) system by dispersing CeO_2 nano-powders as fillers in Poly(ethylene)oxide-$LiClO_4$ matrix. The ceria powders known for their redox and catalytic activity have strongly influenced the structural properties of the PNCEs. XRD and thermal analysis results suggest structural modification in PNCEs that leads to improved ionic conductivity. The maximum conductivity of ~3.0×10^{-5} $S.cm^{-1}$ is observed for 1-2wt.% and 10 wt.% nano-CeO_2 dispersed PNCEs. The d.c. conductivity and hopping frequency are thermally activated. The activation energy of d.c. conductivity (E_a) and ion hopping (E_m) are well correlated, suggesting that PNCEs with smaller interaction energy between Li^+ ions and PEO offer better ionic conductivity.

Keywords: Polymer nanocomposite electrolyte, Nano-CeO_2, a.c. conductivity, hopping frequency.

1. Introduction

Keeping in pace with the recent developments in cathode and anode materials for all-solid-state-Li ion batteries, separator-cum-electrolyte has also drawn significant attention for further improvement [1-2]. In this context, solid polymer electrolyte (SPE) stands out advantageous for its excellent film-forming ability, low-cost processing and design flexibility. However, SPEs made up of simple polymer-salt complex (PS) offers low ionic conductivity rendering it unfit for the immediate applications. Hence, SPEs are further

Download English Version:

https://daneshyari.com/en/article/8013507

Download Persian Version:

https://daneshyari.com/article/8013507

Daneshyari.com