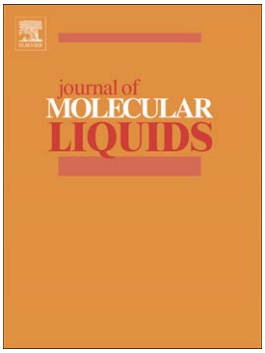

Longitudinal optic excitations in ionic melts within an ion-polarization model: A theoretical study

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PII: S0167-7322(17)34984-X
DOI: doi:10.1016/j.molliq.2018.03.002
Reference: MOLLIQ 8776

To appear in: *Journal of Molecular Liquids*

Received date: 18 October 2017
Revised date: 18 February 2018
Accepted date: 2 March 2018

Please cite this article as: P. Hlushak, M. Tokarchuk, B. Markiv, Longitudinal optic excitations in ionic melts within an ion-polarization model: A theoretical study, *Journal of Molecular Liquids* (2018), doi:10.1016/j.molliq.2018.03.002

Longitudinal optic excitations in ionic melts within an ion-polarization model: A theoretical study

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Abstract

In the present paper we used ion-polarization model to study collective excitations in ionic melts. Based on the extended model for collective dynamics in ionic melts (which takes into account fluctuations of charge density, charge current, its time derivative) we obtained the set of collective excitations in the system, containing relaxation mode related to electric conductivity, two propagating optic-like modes and relaxation mode due to polarization processes. The received analytical expressions for the collective modes take into account corrections caused by ion polarizability comparing to rigid-ion model. The obtained results correctly describe a reduction of frequency of optic-like modes and an increase of damping due to polarization processes. The results are consistent with other theoretical works and results of computer simulations.

Keywords: Ionic melts, collective excitations, optic modes, polarization processes, ion-polarization model
PACS: 05.60.Cd, 61.20.Lc, 62.60.+v

1. Introduction

Liquid ionic systems remain an actual object of investigation for a long time (1; 2; 3; 5; 4; 6; 7). Despite the fact that nowadays particular interest is payed to room temperature ionic liquids, the studies of 'simple' ionic liquids

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