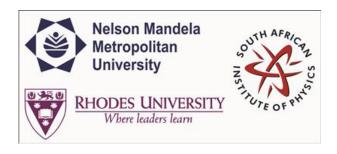
## **SAIP2015**



Contribution ID: 16 Type: Oral Presentation

## Study of Electrical Conductivity of Pr<sup>3+</sup> Containing Lithium Borate Glasses by Impedance Spectroscopy

Friday, 3 July 2015 11:30 (20 minutes)

## Abstract content <br/> &nbsp; (Max 300 words)<br/> dry-<a href="http://events.saip.org.za/getFile.py/starget="\_blank">Formatting &<br/> &classed chars</a>

Lithium borate glasses are very interesting to study because of their technological applications in various field. The complexity and functionality of these glasses are defined by boron anomalies and the concentration of the Li ions. Impedance spectroscopy plays a vital role in characterization of these glasses for solid electrolyte applications. An impedance study provides multidimensional electrical and structural information about the conducting glasses. Though lithium borate glasses offer good conductivity, their conductivity performance under the influence of rare earth ions is less known. In the current trend rare earth (RE) oxides are used for a variety of optical applications due to their interesting <i>4f</i>and <i>5d</i>orbitals. Among the RE ions, the Pr ion is of a particular interest, because it gives rise to a number of energy levels. The intention behind the present work is to understand the conductivity behavior of glasses in the presence of Pr<sup>3+</sup>. In order to comprehend the conduction properties, the glass series was prepared with the general formula 27.5 Li < sub > 2 < / sub > O - (72.5 - X)B < sub > 2 < / sub > O < sub > 3 < / sub > - XPr < sub > 6 < / sub > O < sub > 11 < / sub > (X=0.5, 1, 1, 1) < (X=0.5, 1, 1) < (X1.5 and 2) by a melt quench technique. The prepared glasses were analyzed by using the impedance spectroscopy technique. The conductivity of prepared glasses decreases and activation energy increases with increase in Pr<sup>3+</sup>. The decrease in conductivity is mainly due to the higher molecular weight of Pr<sup>3+</sup>. To understand the conduction mechanism of these glasses, scaling were performed. The overlapping of the data on the single master curve reveals that the conduction mechanism is compositional dependent. This study demonstrate the role of Pr<sup>3+</sup> ions on the conducting properties glasses.

Apply to be<br/>br> considered for a student <br/>br> &nbsp; award (Yes / No)?

No

Level for award<br/>
-&nbsp;(Hons, MSc, <br>
-&nbsp; PhD, N/A)?

No

Main supervisor (name and email)<br/>
-and his / her institution

Prof. H. C. Swart swarthc@ufs.ac.za Would you like to <br> submit a short paper <br> for the Conference <br>> Proceedings (Yes / No)?

Yes

## Please indicate whether<br/> <br/>br>this abstract may be<br/> br>published online<br/> <br/>(Yes / No)

Yes

**Primary author:** Dr RAMTEKE, Durgaprasad (University of the Free State)

Co-authors: Prof. SWART, Hendrik (University of the Free State); Dr GEDAM, Rupesh (Visvesvaraya National

Institute of Technology, India)

**Presenter:** Dr RAMTEKE, Durgaprasad (University of the Free State)

Session Classification: DPCMM

Track Classification: Track A - Division for Physics of Condensed Matter and Materials