

SAIP 2011



Contribution ID : 52

The study of the distortion of F- and Ba- sublattices in superionic BaF₂ at elevated temperatures using positron annihilation technique.

Wednesday 13 Jul 2011 at 17:00 (02h00')

Content :

There is a general misunderstanding regarding the creation of Frenkel pairs in the vicinity of the observed critical temperature T_c in superionic materials. The measured conductivity increases sharply at a temperature coinciding with the deviation of temperature-dependent lattice constant from 6.2086 Å. Frenkel pairs responsible for superionic conduction are gradually generated well below the critical temperature and this is informed by the calculation of S-parameter through the measurements of Doppler Broadening at various temperature points. It is interesting to note that the lattice constant plays a pivotal role in the superionic conductivity threshold. Positron annihilation spectroscopy, through the determination of positron lifetime and Doppler broadening, reveals that the generation rate of Frenkel pairs becomes prominent at 100 K below the critical temperature of 693 K. This is also a clear indication of continuous disordering of fluorine sublattice noticeable at a temperature of 593 K. The fact that the defect positron lifetime is constant in the temperature range (300 – 900) K confirms a non-distortion of Ba-sublattice.

Level (Hons, MSc, PhD, other)? :

PhD

Consider for a student award (Yes / No)? :

No

Short Paper :

Yes

Primary authors : Mr. JILLI, Thulani (University of Zululand)

Co-authors : Prof. SIDERAS-HADDAD, Elias (University of the Witwatersrand) ; Dr. WAMWANGI, Daniel (University of the Witwatersrand)

Presenter : Mr. JILLI, Thulani (University of Zululand)

Session classification : Poster1

Track classification : Track A - Condensed Matter Physics and Material Science

Type : Poster Presentation