Joint Workshop of the COST MP0904 Action, 12 August, 2010, Edinburgh, United Kingdom, Programme and book of abstracts, p 25

Relaxor behavior of Barium Bismuth Titanate

J.D.Bobić[1], M.M.Vijatović[1], S. Greičius[2], J. Banys[2], B.D.Stojanović[1]

[1]Institutefor Multidisciplinary Researches, Kneza Viseslava 1, 11000 Belgrade, Serbia
[2]Faculty of Physics, Vilnius University, 9 Sauletekio str., 10222 Vilnius, Lithuania

Corresponding author:jelenabobi@yahoo.com

Bi-based Aurivillius family of compounds have received considerable attention as the materials for ferroelectric random access memory (FRAM) because of their low operating voltage, fast switching speed, large remnant polarization, low coercive field, superior polarization fatigue resistant characteristics and high. Relaxor ferroelectrics are attractive for a wide range of applications owing to their high dielectric and piezoelectric responses over a wide range of temperaturea.

$BaBi_4Ti_4O_{15}$[BBiT] was prepared by solid state reaction from different starting oxides.The microstructure of is $BaBi_4Ti_4O_{15}$dominated by the presence of rounded edges platelet-like grains up to 1 μm size and 0.2 μm thickness. The rounded edges of grains could be attributed to liquid phase sintering.The dielectric measurements results give an evidence of a diffuse phase transition accompanied by a relaxation of the permittivity in frequency interval from 1.21 kHz to1 MHz. This behavior is typical for relaxor ferroelectric. A modified Curie - Weiss relationship is used to study the diffuseness behavior of a ferroelectric phase transition. The value of γ is found to be 1.88, which reveals the near-relaxor nature of BBiT ceramics.An empirical Vogel - Fülcher relationship is used to account the dielectric relaxation nature in relaxor ferroelectrics. According to that model, it is considered that relaxor behavior of BBiT could attribute to the disorder of Ba^{2+} from perovskite slabs $((BaBi_2)Ti_4O_{13})^{2-}$with Bi^{3+} from the $(Bi_2O_2)^{2+}$ layer.

In the present impedance investigations, only a single semicircle with a high frequency side passing through the origin is observed in the 700-1050 K temperature range. The semicircle can be ascribing to the grain component for all investigation temperature. At the higher temperatures, along with the semicircle a small tail is present in the low frequency side which could indicate the electrode-grain interface which serves as traps for space charges. The conductivity data follow the Arhenius law quite well in temperature regions 700-1050 K. The calculated values of activation energy E_a, by linear fitting of the data points is 1.02 eV. The value of E_a for conduction suggested possibility that the conduction in the high temperature range was ionic due to oxygen vacancies.