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PREPARATION AND CHARACTERISATION OF THE $Ba(Zr,Ti)O_3$ CERAMICS WITH RELAXOR PROPERTIES

C.E. CIOMAGA[1], M. VIVIANI[2], M.T. BUSCAGLIA[2], V. BUSCAGLIA[2], R. CALDERONE[3], L. MITOSERIU[1]
[1]Dept. of Solid State and Theoretical Physics, Al. I. Cuza Univ, Iasi, Romania.
[2]Institute for Energetics & Interphases – CNR, Genoa, Italy.
[3]Dept. Chemical & Process Engineering, University of Genoa, Genoa, Italy.
crisfedor@yahoo.com

$Ba(Zr_xTi_{1-x})O_3$ ceramics with various compositions x in the range (0, 0.5) have been prepared via solid state reaction. Optimum parameters for calcination and sintering have been found in order to obtain pure perovskite phase and high density ceramics. The dielectric data showed a transition from ferroelectric towards relaxor state and a shift of the Curie temperature towards lower values with increasing x. Using the modified Landau model for relaxors, the local order parameter has been calculated. Its temperature dependence shows the increasing of the degree of diffuseness of the phase transition with increasing Zr with a maximum for the composition x=0.35. The model also shows that in the relaxor state the local order parameter has non-zero values even at a few hundreds degrees above the temperature corresponding to the maximum of the dielectric constant. Further, the dielectric data obtained for x=0.35 under field cooling (FC) and zero-field cooling (ZFC) conditions shows a splitting characteristic to the relaxors and spin-glass systems.

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ELECTRICAL BEHAVIOUR OF DOPED CALCIUM COPPER TITANATE CERAMICS

P. LERET[1], J.F. FERNANDEZ[1], A.C. CABALLERO[1], J. DE FRUTOS[2], D. FERNANDEZ-HEVIA[3]
[1]Instituto de Cerámica y Vidrio – CSIC, Cantoblanco, Madrid, Spain.
[2]Dept. de Física Aplicada a las T.I., ETSI Telecomunicacion – UPM, Madrid, Spain.
[3]INAEL, S.A., Toledo, Spain.
pleret@icv.csic.es

The recent observation of a giant dielectric constant in calcium copper titanate, CCTO, has led to considerable efforts aimed to understanding the origin of this behaviour. In addition to that behaviour strong non-linear I-V response has been reported. The high frequency dielectric constant of about 10^4-10^5, is practically frequency independent between dc and 10^6Hz and possesses good temperature stability over a range from 100 to 400 K. Nevertheless, the relatively high dissipation factor in CCTO is not desirable for practical applications. The dielectric properties of CCTO can be explained in terms of a capacitive-layer model, as for an inhomogeneous semiconductor, consisting of semiconducting grains and insulating grain boundaries.
In this work a comparative study of CCTO based ceramic doped with Fe^{3+} and Nb^{5+} were aimed to modify the electronic transport. XRD and FESEM analysis, dielectric properties and I-V response curves were afforded to correlate the microstructure with the properties. The non-linearity in the I-V response is weak and only was found for doped materials. This behaviour seems to be related to the decrease of resistivity of the sample based on a charge compensation mechanism. Doped samples shown a considerable increase of the dielectric constant.