EMF-2007

11th European Meeting on Ferroelectricity

Programme and Book of Abstracts

Bled, Slovenia, 3-7 September 2007

MONDAY, 3 September 2007

9:15 - 9:45	OPENING		
9:45 - 10:00	BREAK		
	Session 1 – Festival Hall PHASE TRANSITIONS, CRITICAL PHENOMENA AND PRECURSORS	Session 2 – Cankar Hall RELAXORS	Session 3 – Prešeren Hall NANOSTRUCTURES AND NANOPARTICLES
	Chair: R. Blinc	Chair: S. Lushnikov	Chair: M. Glinchuk
10:00 - 10:30	Naresh Dalal (Invited) *Coexisting Order-Disorder and Displacive Behavior in KDP and Squaric Acid Analogs Revealed by High Resolution*	Stanislav Kamba (Invited) *Dielectric Spectroscopy of Relaxors and Multiferroics from Hz to THz Region*	Vladimir Fridkin (Invited) *The Absence of the Critical Thickness in the Ferroelectric Langmuir-Blodgett Copolymer Films*
10:30 - 10:45	Sylvain Ravy *First High-pressure Study of X-ray Diffuse Scattering in $BaTiO_3$ and $KNbO_3$*	Alexei Bokov *Can Hydrostatic Pressure Induce the Ferroelectric-to-Relaxor Crossover?*	Takuya Hoshina *Complex Structure and Size Effect of Barium Titanate Fine Particles*
10:45 - 11:00	Igor Flerov *Mechanism of Ferroelectric and Ferroelastic Phase Transitions in Elpasolite-Related Oxyfluorides $A_2AMoO_3F_3$ ($A=NH_4$, K)*	Jean Toulouse *The Three Characteristic Temperatures of Relaxor Dynamics and Their Meaning*	Johannes Koppensteiner *The Glass Transition in Nano-confined Geometry Probed by DMA*
11:00 - 11:30	COFFEE BREAK		
	Chair: M. Itoh	Chair: A. Levstik	Chair: V. Fridkin
11:30 - 12:00	Jan Dec (Invited) *Dielectric and Heat Capacity Responses of Strontium-Barium Niobate*	Sergey Lushnikov (Invited) *Relaxation Mode and Central Peak in Relaxor Ferroelectrics*	Maya Glinchuk (Invited) *Ferroelectricity Induced by Confinement Conditions in the Incipient Ferroelectric Nanorods*
12.00 - 12:15	María del Carmen Gallardo *Memory Effect in TGS Induced by a Transverse Electric Field: Specific Heat Measurement*	Brahim Dkhil *A New Critical Temperature in Lead-based Relaxors*	Gil Rosenman (Invited) *Physics and Engineering of Ferroelectric Nanodomain Configurations for Nonlinear Photonics*
12:15 - 12:30	Vadim Grebenev *High Temperature Phase Transitions with the Change of Chemical Composition in $K_3H(SO_4)_2$*	Miguel Algueró *Size Effect on the Transition Between the Ferroelectric and Relaxor States in $0.8Pb(Mg_{1/3}Nb_{2/3})O_3$-$0.2PbTiO_3$ Ceramics*	
12:30 - 12:45	Petr Hána *Phase Transition Ultrasonic Study in Lead Zinc Niobate - Lead Titanate Single Crystal Solid Solutions Near Morphotropic Phase Transition*	Vitaliy Bondarev *Electric Field Effect on Heat Capacity of Ferroelectric - Relaxor $PbMg_{1/3}Nb_{2/3}O_3$*	Jelena Bobić *Structure and Properties of Barium Bismuth Titanate Prepared by Mechanochemical Synthesis*
12:45 - 13:00	Akira Kojima *Ferroelectric Transition of Barium Titanate Suggesting Monoclinic-Sandwiched Domain Formation*	Michail Gorev *Heat Capacity and Thermal Expansion Study of $Ba_{1-y}Bi_{2y/3}(Ti_{1-x}Zr_x)O_3$ Ceramics*	Dieter Michel *NMR on Ferrolectrics Confined in Porous Matrices*

Determination of ^{17}O EFG Tensor in $BaTiO_3$ and $SrTiO_3$ Single Crystals via Quadrupole-Perturbed NMR

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Studies of ferroelectricity in perovskites have been intensified after a low temperature ferroelectric phase has been discovered [1] in ^{18}O isotopically enriched $SrTiO_3$. Most atomic models of ferroelectricity in oxide perovskites such as $BaTiO_3$ and $SrTiO_3$ are electrostatic ionic models [2,3] with polarizable oxygen ions. Covalent bonding models have as well been proposed [4]. Some basic information about the polarizability and bonding of the titanium and oxygen ions in perovskites is however still missing.

We have determined the ^{17}O electric field gradient (EFG) and chemical shift tensors in the paraelectric and ferroelectric phases of isotopically enriched $BaTiO_3$ and $SrTiO_3$ single crystals via ^{17}O quadrupole-perturbed NMR. The difference in the ^{17}O chemical shifts between $BaTiO_3$ and $SrTiO_3$ is found to be relatively small, whereas there is a large and unexpected difference in the ^{17}O EFG tensors even in the cubic phases. These experimental findings are to be addressed theoretically using first-principles calculations and should therefore stimulate further work on the origin of ferroelectricity in $BaTiO_3$ and $SrTiO_3$.

[1] M. Itoh, R. Wang, Y. Inaguma, T. Yamaguchi, Y- J. Shan and T. Nakamura, Phys. Rev. Lett. 82, 3540 (1999).
[2] H. Bilz, G. Benedek and A. Bussmann-Holder, Phys. Rev. B 35, 4840 (1987).
[3] H. Zhong, R. D. King-Smith and D. Vanderbilt, Phys. Rev. Lett. 72, 3618 (1994); R. Sommer, M. Maglione and J. J. van der Klink, Ferroelectrics 107, 307 (1990).
[4] H. D. Megaw, Acta Cryst. 7, 187 (1954).

Structure and Properties of Barium Bismuth Titanate Prepared by Mechanochemical Synthesis

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Recently there has been renewed interest in the properties of the Aurivillius phases as temperature-stable ferro-piezoelectrics [1]. Several bismuth-layered crystal structures and their properties have been investigated in detail [2]. However, a lot of aspects of the preparation and properties of barium bismuth titanate remain unexplored, whereas being promising candidate for memory aplications.

In present work barium bismuth titanate ($BaBi_4Ti_4O_{15}$-BBT) was prepared from stoichiometric quantities of barium titanate and bismuth titanate obtained via mechanochemical synthesis. Barium titanate ($BaTiO_3$-BT) has been synthesised from mixture of BaO and TiO_2 and bismuth titanate ($Bi_4Ti_3O_{12}$-BIT) was prepared starting from Bi_2O_3 and TiO_2, commercially available. Mechanochemical synthesis was performed in air atmosphere in a planetary ball mill, for BT during 60 min and for BIT during 360 min. Milling conditions were: zirconium oxide jars and zirconium oxide balls, ball-to-powder weight ration 20:1 and determined basic disc and disc with jars rotation speed. The powder mixture of BT and BIT was homogenized for 60 min.

$BaBi_4Ti_4O_{15}$ ceramics were sintered at 1100°C for 2, 4 and 12 hours without pre-calcination step. The heating rate was 10°C/min. The formation of phase and crystal structure of $BaTiO_3$, $Bi_4Ti_3O_{12}$ and $BaBi_4Ti_4O_{15}$ were approved by XRD analysis. The morfology of obtained powders and microstructure were exhamined by SEM method. The electrical properties of sintered samples were carried out.

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[2] I. Pribošić, D. Makovec, M. Drfenik, J. Eur. Ceram. Soc. 21, 1327-1331 (2001).