ABSTRACT BOOK



WELCOME TO THE CONFERENCE ON ADVANCES IN FUNCTIONAL MATERIALS 2017

Overview

After the grand success of the 1st and the 2nd edition of Advances in functional Materials (AFM) Conference, we, the Conference Co-chairs and the organizing committee welcome you again to the 3rd International Conference on Advances in Functional Materials (AFM 2017) that is going to be held at University of California, Los Angeles Campus (UCLA) from August 14-17, 2017 in the sprawling Southern California city and the center of the international film and television industry.

The objective of this international event is to present and share up to date researches and findings in the field of functional materials science. The conference will provide a platform for the researchers to find global partners for future collaboration. More than 1300 abstracts have been received from all over the world. A large number of participants including scientists, engineers, educators and students from all over the world will attend this event.

In order to maintain the quality of the presented work, all the abstracts have been reviewed by international researchers carefully. Conference participants will benefit from opportunity to submit full original articles for consideration at Materials & Design, a multi-disciplinary journal (impact factor 3.997) published by Elsevier.

In addition, the participants of the conference will also be able to attend the talks from our highlyreputed Keynote Speakers from all over the world.

The venue of the conference is always carefully chosen for you to spend quality and enjoyable time on and off the conference. Los Angeles is an ideal location for leisure and recreational activities. Magnificent nature, abundant tourist assets, convenient access and lodgings, warm and friendly people.

We are warm-heartedly extending our welcome to you and hope that you will join us in UCLA for a stimulating Conference, a friendly gathering amongst friends and simply a good time.

Preparation, structure, and functional properties of NBT- and KNN- based perovskite ceramics

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Increasing concern on the environment safety stimulated investigations of lead-free ferroelectric materials on the base of barium titanate $BaTiO_3$ (BT), bismuth-sodium titanate $(Na_{0.5}Bi_{0.5})TiO_3$ (NBT) and sodium-potassium niobate $(K_{0.5}Na_{0.5})NbO_3$ (KNN) perovskites in order to replace widely used Pb-containing materials.

In this work, influence of donor (Nb⁵⁺) and acceptor dopants (Mn³⁺, Fe³⁺, Ni³⁺) on structure, dielectric and ferroelectric properties of compositions close to Morphotropic Phase Boundaries (MPB) in KNN-BT and NBT-BT systems have been studied. Over stoihiometric additives (KCl, LiF, Bi₂O₃, V₂O₅) were used to improve sintering of ceramics. Ceramic samples were prepared by the two-step solid state reaction method at temperatures of 970–1470 K.

The samples were characterized by the X-ray Diffraction, Scanning Electron Microscopy, Second Harmonic Generation, and Dielectric Spectroscopy methods. Piezoelectric properties of poled samples were measured using the YE2730A d_{33} -meter.

Ferroelectric phase transitions were revealed at ~ 350-400 K and at ~ 550 K (NBT-BT), and at ~700 K (KNN-BT). Using the SHG method, increase in the spontaneous polarization value was observed in NBT-based ceramics with Na/Bi content >1 mainly due to presence of admixture phases with ferroelectric properties (Na₂Ti₆O₁₃ and Bi₄Ti₃O₁₂). Effects of dielectric relaxation at high temperatures were observed in ceramics with deficiency in the A-sites and containing cations with mixed valence in the B-sites of the perovskite lattice. At the room temperature, improvement of functional parameters was observed in modified ceramics. This confirms prospects of new lead-free piezoelectric materials development on the base of modified KNN-BT and NBT-BT compositions close to the MPB.

Keywords: perovskite, ceramic, ferroelectrics, piezoelectrics

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