INTERNATIONAL CONFERENCE ON

NANOSTRUCTURED BIOCERAMIC MATERIALS

VILNIAUS UNIVERSITETAS · 1579 · UNIVERSITAS VILNENSIS

2020 December 1-3rd | VILNIUS UNIVERITY | VILNIUS

Vilnius University Press

WELCOME

The aim of the conference is to overview and share information about the latest achievements in bioceramic nanotechnologies with the scientific community. Over the duration of the conference, scientists from the fields of chemistry, physics, technology, medicine and implantology will be able to acquaint themselves with synthesis methods, unique properties, and applications of bioceramic nanomaterials.

TABLE OF CONTENTS

The book was compiled by:

Aivaras Kareiva (ORCID 0000-0002-9375-7226)
Greta Inkrataitė (ORCID 0000-0001-7173-7454)
Liudas Daumantas (ORCID 0000-0002-2649-4286)

ISBN 978-609-07-0557-5 (digital PDF)

Crystal Structure and Magnetic Properties of $Bi_{1-x}Sm_xFeO_3$ Compounds Across the Phase Boundary: Effect of External Pressure

S.I. Latushka[1*], D.V. Zhaludkevich[1], M. Silibin[2], A. Pakalniškis[3], A. Kareiva[3], R. Skaudžius[3], D.V. Karpinsky[1]

[1]*Scientific-Practical Materials Research Centre of NAS of Belarus, 220072 Minsk, Belarus*

[2]*National Research University of Electronic Technology "MIET", 124498 Zelenograd, Moscow, Russia*

[3]*Institute of Chemistry, Vilnius University, LT-03225 Vilnius, Lithuania*

e-mail: latushkasi@gmail.com

ABSTRACT

Over the last decades, ferrites and manganites have attracted great attention of scientific society [1, 2]. Especially the compounds with chemical composition near the phase boundary and characterized by metastable structural state. Metastable structural state provides frustration of ferroic orders which opens up new possibilities for practical applications of the BiFeO3-based multiferroic materials [3]. Samples of the Bi1-xSmxFeO3 system with dopant ion concentrations up to x = 0.20 were prepared by the sol-gel reaction method. Structural measurements for the compounds Bi1-xSmxFeO3 showed a transition from the rhombohedral phase to the nonpolar orthorhombic phase through the antipolar orthorhombic phase with an increase in the dopant content, followed by stabilization of the nonpolar orthorhombic phase. An application of external pressure (P~5GPa) to the compounds having chemical composition across the phase boundary region leads to significant modification of the crystal structure and magnetic properties of the compounds. Thus, an application external pressure provides a stabilization of the orthorhombic states, viz. the polar rhombohedral phase diminishes and transforms to the anti-polar orthorhombic phase, while the anti-polar orthorhombic phase transforms to the non- polar orthorhombic phase. Magnetic properties of the compounds subjected to external pressure demonstrate increase in the magnetization of the compounds having dominant rhombohedral phase, wherein coercivity significantly increases, while the spontaneous magnetization remains nearly constant.

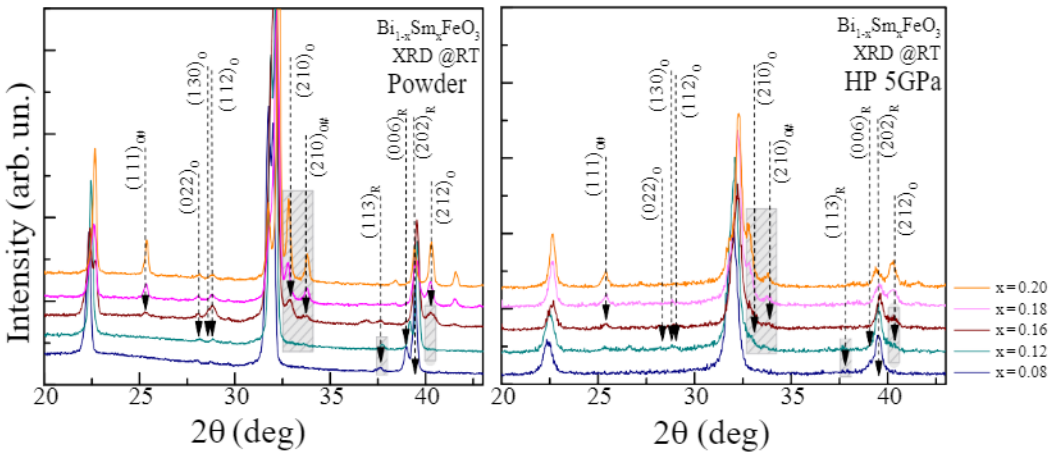

Fig. 1. Room-temperature XRD patterns obtained for the compounds powder and HP $Bi_{1-x}Sm_xFeO_3$ with x = 0.08, 0.12, 0.16, 0.18 and 0.20.

Acknowledgement

This work was supported by the European Union's Horizon 2020 research and innovation programme (RISE No. 778070), BRFFR and RFBR (project F20R-123. №20-58-00030).

References

1. R. Masrour, A. Jabar et al. *Solid State Commun*, Experiment, mean field theory and Monte Carlo simulations of the magnetocaloric effect in $La_{0.67}Ba_{0.22}Sr_{0.11}MnO_3$ compound, 2017, 268, 64–69.
2. R. Masrour, A. Jabar et al. *J. Magn. Magn. Mater*, Monte Carlo simulation study of magnetocaloric effect in $NdMnO_3$ perovskite, 2016, 401, 91–95.
3. G. Catalan, J.F. Scott, *Adv. Mater*, Physics and Applications of Bismuth Ferrite, 2008, 634, 2463.