Faculty of Technology
University of Novi Sad

Conference for Young Scientists in Ceramics

10th Students' Meeting
and
3rd ESR COST MP0904 Workshop

Book of Abstracts

Conference for Young Scientists in Ceramics

SM 2013

COST SIMUFER

Novi Sad, Serbia, November 6-9, 2013

CONFERENCE for YOUNG SCIENTISTS in CERAMICS

The Tenth Students' Meeting, SM-2013
The Third ESR Workshop, COST MP0904

PROGRAMME
and
BOOK OF ABSTRACTS

November 6-9, 2013
Novi Sad, Serbia

Programme and Book of Abstracts of The Conference for Young Scientists in Ceramics (The Tenth Students' Meeting - SM-2013, and The Third ESR Workshop, COST MP0904) publishes abstracts from the field of ceramics, which are presented at traditional international Conference for Young Scientists in Ceramics.

Editors-in-Chief

Prof. Dr. Vladimir V. Srdić
Prof. Dr. Liliana Mitoseriu

Publisher

Faculty of Technology, University of Novi Sad
Bul. cara Lazara 1, 21000 Novi Sad, Serbia

For Publisher

Prof. Dr. Zoltan Zavargo

Printing layout

Vladimir V. Srdić, Branimir Bajac

Press

FUTURA, Petrovaradin, Serbia

CIP – Каталогизација у публикацији
Библиотека Матице српске, Нови Сад

666.3/.7(048.3)

STUDENTS' Meeting, Processing and Application of Ceramics (10 ; 2013 ; Novi Sad)

Programme and book of abstracts / The Tenth Students' Meeting [Processing and Application of Ceramics], SM-2013 [and] the Third ESR [Early Stage Researchers] Workshop, COST MP0904 [being a] Conference for Young Scientists in Ceramics, November 6-9, 2013, Novi Sad ; [editors-in-chief Vladimir V. Srdić, Liliana Mitoseriu]. - Novi Sad : Faculty of Technology, 2013 (Petrovaradin : Futura). - XVI, 145 str. : ilustr. ; 24 cm.

Tiraž 170. - Srt. III: Preface / editors. - Registar.

ISBN 978-86-6253-028-8
1. Early Stage Researchers Workshop, COST MP0904 (3 ; 2013 ; Novi Sad) 2. Conference for Young Scientists (2013 ; Novi Sad). - I . SM-2013 v. Students' Meeting Processing and Application of Ceramics (10 ; 2013 ; Novi Sad). - II. ESR Workshop, COST MP0904 v. Early Stage Researchesrs Workshop, COST MP0904 (3 ; 2013 ; Novi Sad). - III. COST SIMUFER v. Early Stage Resrearchers Workshop, COST MP0904 (3 ; 2013 ; Novi Sad)

a) Керамика – Технологија – Апстракти
COBISS.SR-ID 281371911

Preface

The Conference for Young Scientists in Ceramics is organized by the Department of Materials Engineering, Faculty of Technology, University of Novi Sad, Serbia (November 6-9, 2013). This year it consists of two events - The Tenth Students' Meeting, SM-2013, "Processing and Application of Ceramics" and The Third Early Stage Researchers Workshop of the COST Action MP0904 "Single- and multiphase ferroics and multiferroics with restricted geometries".

The first Students' Meeting was held in 1998 as a national meeting for Serbian PhD students and this year tenth meeting will be the seventh international in a row. For several years now, the Meeting has a well earned reputation as an excellent opportunity for the promotion of the work in the field of ceramics done by early stage researchers, being MSc and PhD students or young doctors. Additionally, the young scientists will be in the position to attend sessions covering major general topics of broad interest which will be presented by experienced scientists through the invited lectures. In that way, young researchers will have a chance to participate in the active discussions with their senior colleagues who are all well known scientists in their area of expertise. We strongly hope that the overall activities during this event will create for the young researchers a fruitful platform for finding new topics, ideas and approaches for their scientific research and an excellent opportunity for establishing connections and finding proposals for collaborations.

General idea behind the Conference was and will continue to be the building of the closely intertwined European scientific network by offering the platform for young scientists to meet, discuss and exchange ideas in the ever growing field of ceramics. It is our deepest belief that this approach will be beneficial for both young researchers and the European science as a whole. Therefore, we strongly appreciate that the European Ceramic Society identified the efforts and the enthusiasm we have put into this idea of creating the bridge between young researchers and we truly hope that the European Ceramic Society will support this initiative in the future. Special thanks to the JECS Trust Fund and COST MP0904 for strong financial support of the Meeting. The Conference was also recognized by the Serbian Ministry of education, science and technological development as well as by the Provincial Secretary of science and technological development and we would like to thank them for their endorsement too.

A total number of 122 presentations given by young researchers and 1 plenary lecture and 14 invited talks coming from 26 countries with multidisciplinary profiles will be presented during the conference. It should be emphasised that presented topics cover research subjects of the highest scientific interest: experimental, theoretical and applicative aspects of synthesis, processing, advanced nano/microscale and functional characterisation of various types of structures and ceramic materials.

We wish to express our thanks to the members of the local organizing committee in Novi Sad for their effort and time during preparation of the Meeting, and especially to thank our endorsers and sponsors for making this event possible.

Editors

LIST OF SPONSORS

The European Ceramic Society

The JECS Trust Fund

COST MP0904, SIMUFER

Ministry of Education and Science, Republic of Serbia

Provincial Secretariat for Science and Technological Development

LIST OF ENDORSERS

Faculty of Technology

University of Novi Sad

Tourist organization of Vojvodina

Tourist organization of Novi Sad

CONTENT

PROGRAMME

The Tenth Students' Meeting, SM-2013
PROCESSING AND APPLICATION OF CERAMICS

PLENARY LETURE, SM-2013

INVITED LETURES, SM-2013

ADVANCED CERAMICS, SM-2013

CERAMIC COMPOSITES, SM-2013

TRADITIONAL CERAMICS, SM-2013

The Third Early Stage Researchers Workshop
COST MP0904 - SIMUFER

INVITED LETURES, COST-ESR

FERROELECTRIC & MULTIFERROICS & THERMOELECTRIC, COST-ESR

INDEX OF AUTHORS

and the direction of the ferroelectric polarization can be controlled by a weak magnetic field (< 0.02 T). Due to the fact that the Y-type hexaferrites are an intermediate phase during the synthesis of Z-type ferrites, which is suitable for multy-layer chip inductors, not much attention has been paid to their synthesis and magnetic investigation especially what concerns powders. We present the structural and magnetic properties of multiferroic $Ba_2Mg_2Fe_{12}O_{22}$ hexaferrite powders containing a small amount of $MgFe_2O_4$. The samples were obtained by auto-combustion or by sonochemical co-precipitation. The XRD spectra of the powders showed the characteristic peaks corresponding to the Y-type hexaferrite structure ($Ba_2Mg_2Fe_{12}O_{22}$) as a main phase and some impurity of $MgFe_2O_4$ less than 2%. The Rietveld refinement of the crystal structure of the $Ba_2Mg_2Fe_{12}O_{22}$ revealed that the Mg^{2+} cations are distributed over all cation sites leading to mixed occupancies of sites in the cation sublattice. The particles obtained by sonochemical co-precipitation had an almost perfect hexagonal shape in contrast with those prepared by auto-combustion. Two magnetic phase transitions related to the composite's multiferroic properties were seen: at 183 K and 40 K for the auto-combustion sample, and at 196 K and 30 K for the sonochemical co-precipitation one. The change at higher temperature is brought about by a phase transition from ferromagnetic state to spiral spin order state. This transition determines the multiferroic properties of $Ba_2Mg_2Fe_{12}O_{22}$. We believe that the transition at lower temperature is related to spin reorientation along the *c* axis into a longitudinal conical state. No magnetic phase transitions in these temperature ranges appeared for $MgFe_2O_4$ sample, i.e., magnesium ferrite does not affect this material's multiferroic properties.

M9

AUTOCOMBUSTION SYNTHESIS AND CHARACTERIZATION OF MULTIFERROIC BISMUTH FERRITE CERAMICS

N. Ilić, A. Džunuzović, J. Bobić, M. Vijatović-Petrović, B. Stojanović
Institute for Multidisciplinary Research, University of Belgrade, Serbia

Bismuth ferrite is one of the most promising single multiferroic materials. It exhibits ferroelectric and antiferromagnetic behavior in wide range of temperatures. Many new applications arise due to possibility of magnetization reorientation by electric field and polarization reorientation by magnetic field [1]. Main problem in usage of $BiFeO_3$ is difficulty of obtaining pure phase ceramic and high conductivity as a result of Fe non-stoichiometry.

$BiFeO_3$ (BFO) powders were prepared by auto-combustion and soft chemical methods starting from iron and bismuth nitrates. After the synthesis, fine precursor powders were thermally treated for various periods at different temperatures and heating rates. In case of auto-combustion synthesis, several fuels (citric acid, sucrose and urea) and fuel to oxidizer ratios (F/O) were examined, while for soft chemical synthesis two complexing agents were tested: citric and tartaric acids. Low temperature synthesis was also tested without any complexing agent. XRD measurements showed presence of

Bi_2O_3, $Bi_2Fe_4O_9$ and $Bi_{25}FeO_{39}$ secondary phases in all powders, and pure perovskite BFO phase for several sintered samples. Powders and ceramics were characterized by SEM/EDS, TG/DTA, particle size distribution and BET surface area measurements. Impedance and magnetic measurements were performed in order to define electrical and magnetic properties of BFO ceramics.

M10

VISCOELASTIC BEHAVIOR OF NEW ANIONIC CLAY – POLYMER HYBRID MATERIALS

L.E. Bibire[1,2], G. Carja[1], M. Bercea[2]

[1]"Gh. Asachi" Technical University, Faculty of Chemical Engineering and Environmental Protection, Dept. Chemical Engineering, 71 Bd. Mangeron, 700050 Iasi, Romania
[2]"Petru Poni" Institute of Macromolecular Chemistry, 41-A Grigore Ghica Voda Alley, 700487 Iasi, Romania

Nanocomposites (PVA/LDHs) based on matrices of hydrotalcite-like clays type MgAlLDH and FeAlLDH and poly(vinyl alcohol) (PVA) were prepared by using the structural reconstruction of the calcined clays. The physical-chemical characteristics of the LDHs-polymer hybrids were studied by using rheological measurements and SEM analysis. The PVA/LDHs nanocomposites were submitted to freezing/thawing cycles and the rheological behavior of the samples was investigated for different freezing periods (0, 7, 14 days).

The viscoelastic parameters (such as: the storage and loss moduli, the loss tangent as well as the complex viscosity) were determined in frequency or temperature sweep tests, in the linear viscoelastic regime, giving information about the evolution of the polymer/clay network as a function of the material composition or experimental conditions. The experimental data show that for a freezing time of 7 days there is a noticeable increase in viscosity; furthermore, after 14 days of freezing the viscosity increases up to 10^4 times. Also, the dependences of the viscoelastic moduli as a function of the oscillation frequency are considerably changed with increasing the freezing time, indicating a transition from a liquid-like behaviour to a solid-like one for the studied hybrids. The yield stress and the tixotropy are sensibly dependent on the freezing time and the aging temperature.

Acknowledgement. This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS-UEFISCDI, project number PN-II-ID-PCE- -2012-4-0057 proposal