11TH CONFERENCE
FOR YOUNG SCIENTISTS IN CERAMICS

Satellite event:
ESR COST IC1208 Workshop

BOOK OF ABSTRACTS

October 21-24, 2105
Faculty of Technology
Novi Sad, Serbia

11th CONFERENCE for YOUNG SCIENTISTS in CERAMICS

Satellite event:

ESR Workshop, COST IC1208

PROGRAMME
and
BOOK OF ABSTRACTS

October 21-24, 2015

Novi Sad, Serbia

Programme and Book of Abstracts of The 11th Conference for Young Scientists in Ceramics (SM-2015, and ESR Workshop, COST MP1208) publishes abstracts from the field of ceramics, which are presented at traditional international Conference for Young Scientists in Ceramics.

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Preface

The 11th Conference for Young Scientists in Ceramics is organized by the Department of Materials Engineering, Faculty of Technology Novi Sad, University of Novi Sad, Serbia (October 21-24, 2015) and it is followed with one Satellite Event: Early Stage Researchers Workshop of the COST Action IC1208 "Integrating devices and materials: a challenge for new instrumentation in ICT".

This Conference first started as the Students' Meeting back in 1998 when it was just a national meeting for Serbian PhD students. After three national, this year is going to be the eighth consecutive international conference held every second year. For several years now, the Conference 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 IC1208 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 110 presentations given by young researchers and 13 invited talks coming from 25 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 Conference, 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 IC1208

Ministry of Education and Science, Republic of Serbia

Provincial Secretariat for Science and Technological Development

LIST OF ENDORSERS

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Tourist organization of Novi Sad

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Paula Vilarinho, Portugal, Is potassium-sodium niobate a lead free alternative to PZT?

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Ákos Kukovecz, Hungary, Nanotechnology and sensors nanocomposites

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15.45 – 16.00 h	**A3 – V. Nikolic, *et al*., Serbia** Solvothermal synthesis of magnetite nanoparticles suitable for application in magnetic hyperthermia
16.00 – 16.15 h	**A4 – M. Piciorus, *et al*., Romania** Spherical silica nanoparticles obtained by Stober process.

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16.00 – 16.15 h **C2 – J. Zygmuntowicz, *et al.*, Poland**
Alumina matrix ceramic-nickel composites formed by centrifugal slip casting

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16.30 – 16.45 h **A10 – P. Ctibor, *et al.*, Czech Republic**
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16.45 – 17.00 h – Coffe Break (Blue Hall & Class Room, R10)

17.00 – 18.15 h – Section 2

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Development of core-shell structured metal oxide powders to be used as lithium ion battery cathode materials

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Aluminum-doped $Li_7La_3Zr_2O_{12}$ as a solid electrolyte for lithium-ion batteries

17.30 – 17.45 h **A12 – D. Ciria, *et al.*, France**
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Mechanical and thermal properties of silicon nitride-titanium nitride particulate composites

17.30 – 17.45 h **C6** – **A. Wilk, *et al.*, Poland**
Aluminium oxynitride - hexagonal boron nitride composites with anisotropic properties

17.45 – 18.00 h **C7 – O. Poliarus, *et al.*, Ukraine**
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THURSDAY, OCTOBER 22, 2015.

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09.30 – 09.45 h **A16 – A. Levish, *et al*., Germany**
Chemical vapor synthesis of aluminum nitride nanoparticles from metalic aluminum

09.45 – 10.00 h **A17 – R. Crisan, *et al*., Romanial**
Nano-meter sized maghemite with high surface area and superparamagnetic behavior synthesis by oxidation of magnetite

10.00 – 10.15 h **A18 – S. Lukic, *et al*., Germany**
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10.30 – 10.45 h **A19 – N. Kanas, *et al*., Norwey**
Ceramic processing of all-oxide ceramic thermoelectric module

10.45 – 11.00 h **A20 – J. Lelièvre, *et al*., France**
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11.00 – 11.15 h **A21 – J. Ćirković, *et al*., Serbia**
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09.15 – 09.30 h **A22 – D. Larionov, *et al*., Russia**
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09.30 – 09.45 h **A23 – M. Putz, *et al*., Romania**
Mixed cationic templates controlling ordered silica morphology

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The influence of polymer characteristics and particle morphology on the elution control of vanadate ions from V_2O_5/polymer composites

10.00 – 10.15 h **A24 – A. Wajda, *et al*., Poland**
The structure and textural characterization of zinc doped

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Evaluation of mesoporous silica and titanium dioxide as antiobiotic carriers in drug delivery systems

10.30 – 10.45 h **A26 – A. Vladescu, *et al*., Romania**
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12.30 – 13.15 h – IT5 Invited lecture (Rectorate-Amphitheater)
Markus Winterer, Germany, Routes to nanoparticles optimized for energy technology

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Effect of poling on dielectric, piezoelectric and ferroelectric properties of doped potassium sodium niobate

15.45 – 16.00 h **E2 – J. Zaffran, *et al*., *Israel***
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16.00 – 16.15 h **E3 – O.A. Condurache, *et al*., Romania**
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16.15 – 16.30 h **E4 – N.I. Ilić, *et al*., Serbia**
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16.30 – 16.45 h **E5 – L. Fulanović, *et al*., Slovenia**
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3D Mesoporous oxide supported platinum nanoparticles for heterogenous catalytic applications - Gas vs. liquid phase reactions

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16.00 – 16.15 h **A31 – A. Bjelajac, *et al*., Serbia**
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16.15 – 16.30 h **A32 – M. Nakielska, *et al*., Poland**
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16.30 – 16.45 h **A33 – I. Dinić, *et al*., Serbia**
Hydrothermal synthesis of optically active rare earth fluorides

16.45 – 17.00 h **A34 – M. Chaika, *et al*., Ukraine**
Influence of Yb^{2+} on optical properties of YAG:Yb garnet

17.00 – 17.15 h – Coffe Break (Blue Hall & Class Room, R10)

17.15 – 18.30 h – Section 5

COST Workshop - 2 (Blue Hall)

17.15 – 17.30 h **E7 – B. Bajac, *et al*., Serbia**
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17.30 – 17.45 h **E8 – V.A. Lukacs, Romania**
Biomorphic growth and functional properties of nickel oxide 1-D microstructures

17.45 – 18.00 h **E9 – B. Belec, *et al*., Slovenia**
Magnetic properties of plate-like composite nanoparticles combining soft-magnetic iron oxide with hard-magnetic barium hexaferrite

18.00 – 18.15 h **E10 – I.V. Ciuchi, *et al*., Italy**
Enhancement of the energy storage properties in PLZT

ceramics with compositions across FE-AFE phase boundary

18.15 – 18.30 h **E11 – E. Đurđić, *et al*., Serbia**
The cation distribution in $NiFe_2O_4$ and $NiFe_{1.85}Y_{0.15}O_4$: Raman and X-ray diffraction studies

Engineering ceramics - 2 (Class Room, R10)

17.15 – 17.30 h **A35 – S. Ilic, *et al*., Serbia**
Phase development and thermal behaviour of hybrid sol-gel derived mullite precursor

17.30 – 17.45 h **A36 – A. Dudek, *et al*., Poland**
Subcritical crack growth in oxide and non-oxide ceramics using the Constant Stress Rate Test

17.45 – 18.00 h **A37 – T. Csanádi, *et al*., Slovakia**
Micro-scale plasticity and elastic behaviour of ceramic crystals under micropillar compression

18.00 – 18.15 h **A38 – K. Kornaus, *et al*., Poland**
The influence of sintering temperature and additive on the microstructure of pressure-less sintered tungsten carbide

18.15 – 18.30 h **C11 – E. Okur, *et al*., Turkey**
Improving the thermal shock properties of Y-alpha-SiAlON/glass composite

20.00 h – Social Event

Restaurant "Fontana" *Meeting of Young Ceramist Network of the European Ceramic Society*, Invited speakers: Paula Vilarinho and Francis Cambier

FRIDAY, OCTOBER 23, 2015.

09.15 – 11.15 h – Section 6

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09.15 – 09.30 h **E12 – A. Chandran, *et al*., Serbia**
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09.30 – 09.45 h **E13 – V. Preutu, *et al*., Romania**
Preparation and properties of PCL-functional oxide composites

09.45 – 10.00 h **E14 – A. Dzunuzovic, *et al*., Serbia**
Properties of $BaTiO_3$ - $NiZnFe_2O_4$ multiferroic composites obtained by auto-combustion synthesis

10.00 – 10.15 h **E15 – J. Vukmirovic, *et al*., Serbia**
Fabrication of $BaTiO_3$ thin films by inkjet printing

Ceramics processing - 2 (Blue Hall)

10.15 – 10.30 h **A39 – J. Hruby, *et al*., Czech Republic**
Calculation of activation energy and its changes during sintering using MSC and Wang & Raj models

10.30 – 10.45 h **C12 – A. Miazga *et al*., Poland**
Graded ceramic/metal composites obtained by the centrifugal slip casting

10.45 – 11.00 h **A40 – V. Mackert *et al*., Germany**
UV laser sintering of SnO_2 and ZnO thin films produced by electrophoretic deposition

11.00 – 11.15 h **A41 – R. Cabezas-Rodríguez, *et al*., Spain**
Synthesis of yttrium silicate by solid-liquid state reaction for environmental barrier coatings

Bioceramics - 2 (Class Room, R10)

09.15 – 09.30 h **A42 – S. Kurbatova, *et al*., Russia**
Synthesis and characterization of resorbable calcium phosphate bioceramics with a ratio of $0,5 \leq Ca/P \leq 1$

09.30 – 09.45 h **A43 – M.J. Lukić, *et al*., Serbia**
Simultaneous thermal analysis and dilatometric study of HAp-$LiFePO_4$ system

09.45 – 10.00 h **A44 – M. Slama, *et al*., Czech Republic**
Effect of colloidal milling on the physical, mechanical and biological properties of hydroxyapatite monoliths prepared by electrophoretic deposition

10.00 – 10.15 h **A45 – L. Stipniece, *et al*., Latvia**
Synthesis and characterization of divalent cation substituted calcium phosphates

10.15 – 10.30 h **A46 – M. Kuzina, *et al*., Russia**

Mixed-anionic calcium phosphate powders for bioresorbable ceramic

10.30 – 10.45 h **A47 – T. Maravić, *et al.*, Serbia**
Influence of dental composite core material on biomedical properties of premolars restored with a zirconia full crown: A finite element analysis

10.45 – 11.00 h **A48 – T. Uhlířová, *et al.*, Czech Republic**
Elastic properties of cellular alumina ceramics prepared by biological foaming

11.00 – 11.15 h **A49 – M. Mirković, *et al.*, Serbia**
Synthesis of monetite ($CaHPO_4$) by mechanochemical treatment of brushite ($CaHPO_4 \cdot 2H_2O$)

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11.45 – 12.30 h – IT8 Invited lecture (Rectorate-Amphitheater)
Lucian Pintilie, Romania, Polarization driven effects and the role of interfaces in ferroelectric thin films and heterostructures

12.30 – 13.15 h – IT9 Invited lecture (Rectorate-Amphitheater)
Endre Horváth, Hungary, From synthesis to application of photovoltaic perovskite nanowires

13.15 – 14.45 h – Lunch (TF-Ceremonial Hall)

14.45 – 17.00 h – Section 7

Popular science (Blue Hall)

14.45 – 15.15 h **IT10 Invited lecture – Roger Anderton, Great Britain**
Boscovich's Unification that came after Newton's Unification

15.15 – 15.45 h **IT11 Invited lecture – Dragoslav Stoiljkovic, Serbia**
From Boscovich's theory to modern quantum theory

Bioceramics - 3 (Blue Hall)

15.45 – 16.00 h **C13 – G. Kazakova, *et al.*, Russia**
Resorbable bioceramics in $Ca_3(PO_4)_2 – Mg_2P_2O_7$ system

16.00 – 16.15 h **A50 – I. Narkevica, *et al.*, Latvia**
Development of innovative 3D porous TiO_2 ceramic scaffolds for orthopaedic applications

16.15 – 16.30 h **A51 – J. Sekaninova, *et al.*, Czech Republic**
Calcium partially stabilized ZrO_2 bioceramics nanocrystals

16.30 – 16.45 h **A52 – M. Prekajski, *et al.*, Serbia**
Ouzo effect – as the new simple nanoemulsion method for synthesis of strontium hydroxyapatite nanospheres

16.45 – 17.00 h **A53 – M.D. Vranceanu, *et al.*, Romania**
Calcium phosphate coatings deposited on Ti substrate using

electrochemically assisted deposition

Equipment (Class Room, R10)

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Slavko Žižek, Slovenia

Catalysts & ceramics for energy (Class Room, R10)

15.45 – 16.00 h **A54 – T. Varga, *et al*., Hungary**
Synthesis, characterisation, and electrochemical properties of graphite oxide/vanadate nanowire composites

16.00 – 16.15 h **A55 – N. Lysunenko, *et al*., Ukraine**
Electrical efficiency of SOFCs with 8YSZ and 10Sc1CeSZ electrolytes

16.15 – 16.30 h **A56 – S. Dmitrović, *et al*., Serbia**
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16.30 – 16.45 h **A57 – K.L. Juhasz, *et al*., Hungary**
Synthesis and characterization of platinum nanoparticles with controlled size for heterogen catalytic processes

16.45 – 17.00 h **C14 – J. Sroka, *et al*., Poland**
Improved properties of the epoxy – fly ash composites by silane treatment of the filler

17.00 – 17.15 h – Coffe Break (Blue Hall & Class Room, R10)

17.15 – 18.30 h – Section 8

Electroceramics - 2 (Blue Hall)

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17.30 – 17.45 h **A59 – C. Vlădut, Romania**
ZnO based films with sensing properties

17.45 – 18.00 h **C15 – M. Drozdova, *et al*., Estonia**
Electrical behavior of zirconia-alumina nanofibers-graphene composites

18.00 – 18.15 h **C16 – C. Ianasi, *et al*., Romania**
Fe_2O_3-SiO_2-PVA hybrid xerogels, precursors for superparamagnetic nanocomposites, potential candidates as MRI T2 contrast agents

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Electroceramics - 3 (Class Room, R10)

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17.30 – 17.45 h	**C19** – **M. Pareiko, *et al*., Ukraine** Self-fluxing Fe-based alloy with TiB_2 additives for the spraying wear-resistant coatings
17.45 – 18.00 h	**C20** – **D. Németh, *et al*., Slovakia** FEM analysis of cracking around the indent in W-C coating
18.00 – 18.15 h	**C21 – K. Jach, Poland** Modification of quartz and ceramic substrates by deposition of tungsten layers
18.15 – 18.30 h	**C22 – I. Sytnyk, *et al*., Ukraine** The structure and properties of chromium carbide steels with titanium nitride coating

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SATURDAY, OCTOBER 24, 2015.

09.15 – 10.15 h – Section 9

Synthesis of ceramic powders - 3 (Blue Hall)

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09.30 – 09.45 h **A61 – S. Ognjanovic, *et al*., Germany**
Characterization of aluminum nitride nanoparticles synthesized by chemical vapor synthesis

09.45 – 10.00 h **C23 – S. Ilies, *et al*., Romania**
Silver modified zeolite-multi-walled carbon nanotubes-epoxy composite electrode for electrochemical detection and degradation of ibuprofen in water

10.00 – 10.15 h **C24 – T. Minović Arsić, *et al*., Serbia**
Synthesis and characterization of ceria/carbon cryogel composite

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Traditional ceramics - 1 (Class Room, R10)

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Characterization of the interaction between glazes and ceramic bodies

09.45 – 10.00 h **T2 – V. Topalović, *et al*., Serbia**
Properties of sintered cordierite ceramics obtained by sol-gel methods of powder synthesis

10.00 – 10.15 h **T3 – A. Abdelghany, *et al*., Egypt**
Effect of transition metal addition in the bioactivity of borate bioglass: A descriptive correlational study

10.15 – 11.00 h – IT12 Invited lecture (Blue Hall)
Andreja Gajovic, Croatia, Raman spectroscopy technique and specific applications for study of ceramics

11.00 – 11.15 h – Coffe Break (Blue Hall)

11.15 – 12.00 h – IT13 Invited lecture (Blue Hall)
Kostantinos Giannakopulos, Greece, Structural characterisation of layers for advanced non-volatile memories

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12.15 – 12.30 h **T5 – A. Gerle, *et al*., Poland**
Corrosion of $MgCr_2O_4$, $MgAl_2O_4$, $MgFe_2O_4$ spinels in SO_2–O_2–SO_3 atmoshere – thermodynamic evaluation

12.30 – 12.45 h **T6 – O. Chudinovich, *et al*., Ukraine**
Phase equilibria and properties of solid solutions in the La_2O_3-Yb_2O_3 and La_2O_3-Y_2O_3-Yb_2O_3 systems at 1500 °C

12.45 – 13.00 h **T7 – M. Gluszek, *et al*., Poland**
Preparation, properties and applications of shear thickening fluids based on silica, glycols and dopants

Ceramics processing - 2 (Class Room, R10)

12.00 – 12.15 h **C25 – O. Kornienko, *et al*., Ukraine**
Interaction cerium oxide with dysprosia at 1500 °C

12.15 – 12.30 h **A26 – M. Marych, *et al*., Ukraine**
Features of the structure and properties of ceramic composite system B_4C – eutectic alloy (B_4C-TiB_2)

12.30 – 12.45 h **A27 – J. Shishkina, Ukraine**
Fabrication of Ti_xAl_y/TiC based ceramic composite powder from the TiH_2-Al-C system

13.00 – 13.15 h – Closing (Blue Hall)

11th Conference for Young Scientists in Ceramics

SM-2015 & COST Workshop

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For preparation we used a solvent casting method wich implied the use of relatively low temperatures, simple aparature and which leads to composites films with a good distribution of filler in the polymeric matrix.

After the preparation, the composites formation and their characteristic as structure and microstructure were investigated by XRD and SEM. The XRD analyses confirmed the formation of biphasic composites (spinel-polimer/perovskit-polimer) with no other secondary phases. The SEM images showed a very good distribution of the ferroelectric/magnetic nanoparticles in the polymeric matrix.

The frequency dependence of dielectric properties at room temperature have been investigated for all the samples, and discussed in correlation with the microstructural data and a theoretical model based on the microstructural formation.

Acknowledgements: The COST Action IC1208 is highly acknowledged.

References

[1] M.A. Woodruff, D.W. Hutmacher, *Prog. Polymer Sci.*, **35** (2010) 1217.

E14

PROPERTIES OF $BaTiO_3$ -$NiZnFe_2O_4$ MULTIFERROIC COMPOSITES OBTAINED BY AUTO-COMBUSTION SYNTHESIS

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Nickel zinc ferrite (NZF(70-30)) and barium titanate (BT) nanosized powders were synthesised by auto-combustion method. Multiferroic composites with the general formula $x Ni_{0.7}Zn_{0.3}Fe_2O_4$–$(1-x)BaTiO_3$ (x = 0.1, 0.3, 0.5, 0.7, 0.9) were prepared from nickel zinc ferrite and barium titanate powders by mixing in planetary ball mill for 24 h. Pellets were sintered at different temperatures in order to get dense, two phased composites. XRD characterization showed the formation of nickel zinc ferrite spinel structure and perovskite barium titanate structure, without presence of secondary phases. SEM images at the free surface indicated the formation of two types of grain morphology: polygonal grains typical for NZF phase and rounded grains typical for BT phase, both nanosized.

Magnetic measurements of all sintered composites were carried out and presented in Fig. 1. Saturation magnetization moment decreases in comparison with pure NZF, because of non-magnetic barium titanate phase. Coercive field was higher for composites with regard to pure NZF, which can be explained with fact that the composite possesses a higher anisotropy field than the NZF at the same applied field. The fields at which saturation occur was almost the same for all materials

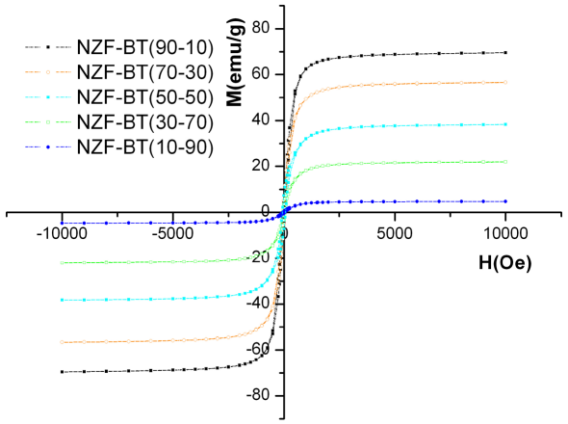

Figure 1. Magnetic measurements of $xNi_{0.7}Zn_{0.3}Fe_2O_4$–(1-x)$BaTiO_3$ ceramics

E15

FABRICATION OF $BaTiO_3$ THIN FILMS BY INKJET PRINTING

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Barium titanate in thin film form is one of the most investigated ferroelectric materials for microelectronics application. The properties of barium titanate thin films are dependent of many factors such as synthesis method, deposition technique, substrate selection, thermal treatment, etc. It has been a challenge to adjust these factors and obtain thin films with required microstructure and functional properties.

In this research, $BaTiO_3$ films were prepared with inkjet printing technique (Dimatix DMP 3000 and Epson XP-202 printer). Inkjet printing is one of the most popular method in thin film production. Although inkjet printing is simple and cheap technique, it is necessary to achieve requiered rheological properties of inks for successful printing process (viscosity, surface tension, particle size). Barium titanate inks were prepared with sol gel technique, where manipulation with rheological parameters is relatively easy. After examination of rheological parameters, inks were deposited on silicon substrates and calcinated at 750 °C. Microstructure of obtained films was investigated by scanning electron microscopy (SEM), atomic force microscopy (AFM), X-ray diffraction and Raman spectroscopy. In addtioin, $BaTiO_3$ thin films were prepared with spin coating method. Thus, advantages and disadvantages of the deposition techniques in production of sol gel prepared barium titanate thin films were investigated.