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

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ESR Workshop, COST IC1208

PROGRAMME
and
BOOK OF ABSTRACTS

October 21-24, 2015

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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

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Tourist organization of Novi Sad

T1

CHARACTERIZATION OF THE INTERACTION BETWEEN GLAZES AND CERAMIC BODIES

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The main reason for the use of these glassy coatings is to increase the resistance of ceramics to various types of corrosive environments without loss of properties.

Glazes and ceramic bodies are in close contact and react chemically and physically during firing. Chemical reactions of individual components take place, change the chemical composition and if the firing process is long enough lead to the formation of interlayers on interfaces. Characterization of the interaction between glazes and ceramic bodies can provide information about application features, firing processes and range and sign of stress in the glaze layer. Glaze defects are caused by improper stresses within glaze layers (tension, compression) or by changes in ceramic bodies (moisture expansion, rehydration) and glaze layers during usage or improper storage of ceramic products.

The study of the interaction between glazes and ceramic bodies was focused on the evaluation of surface defects, determination of the coefficients of the thermal expansion measured by dilatometer and characterization of glaze–body interaction problems.

Acknowledgement: This work was financially supported from specific university research (MSMT No 20/2015).

T2

PROPERTIES OF SINTERED CORDIERITE CERAMICS OBTAINED BY SOL-GEL METHODS OF POWDER SYNTHESIS

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Cordierite ($2MgO{\cdot}2Al_2O_3{\cdot}5SiO_2$) as a ceramic material has great importance in materials science and wide application in industry thanks to its low thermal expansion

and dielectric constant, high chemical and thermal stability and high electrical resistivity. Cordierite ceramics is used for producing supports for electric heaters, ceramic fire resistant materials for furnaces, catalyst supports for the complete combustion of exhaust gases of internal combustion engines, insulation material in high frequency electronics, as well as substrates for integrated circuits and electronic modules.

Properties of sintered cordierite ceramics, where cordierite powders were obtained by alkoxide hydrolitic and non-hydrolitic method, colloidal method and starting from silicic acid, were studied and compared. The properties of sintered materials were observed by SEM of the fracture surfaces and polished and thermally etched samples. The mechanical properties of obtained materials, microhardness and indentation fracture toughness, were determined by microindentation method. The best sinterability showed powder obtained by colloidal method (sintering temperature of 1370 °C for 2 h), and powder obtained by Si-acid method (sintering temperature of 1400 °C for 2 h).

T3

EFFECT OF TRANSITION METAL ADDITION IN THE BIOACTIVITY OF BORATE BIOGLASS: A DESCRIPTIVE CORRELATIONAL STUDY

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Keywords: bioactive borate, biocompatibility, solubility and bone repair.

The basic structure and some physical properties of a bioactive borate glasses containing different types of transition metals were prepared and investigated with an in vitro analysis with the same molar composition as 45S5 glass but with all the silicon dioxide (SiO_2) replaced by boron trioxide (B_2O_3). The biodegradability was explored and estimated by soaking the samples into simulated body fluid (SBF) at 37 °C for fixed periods of time up to 30 days. The pH change of SBF was measured during the soaking periods in order to explore the ionic change processes. The structural changes in the crystalline phases obtained in the glass matrix before and after immersion in SBF were recognized by means of x-ray diffraction (XRD), Fourier transform infrared analysis (FTIR) and scanning electron microscope (SEM). All obtained results support the formation of hydroxyapatite (HA) layer with different amounts that depend on the type of transition metal added to the glass matrix. The biodegradation data and spectral analysis of different samples may consider the material to be a good candidate for use as a bone substituent.