13th CONFERENCE for YOUNG SCIENTISTS in CERAMICS

PROGRAMME and BOOK OF ABSTRACTS

October 16-19, 2019
Novi Sad, Serbia

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Preface

Dear conference participants and readers we have the pleasure to once again welcome you all to Novi Sad, Serbia as the venue for the 13th Conference for Young Scientists in Ceramics. This year again the event is jointly organized by the Faculty of Technology Novi Sad, University of Novi Sad and the Young Ceramists Network (YCN) of the European Ceramic Society.

The Conference for Young Scientists in Ceramics, previously known as the Students' Meeting, is the conference with more than twenty years of tradition. It grew from the Serbian only conference in 1998 to the truly international event with participants coming from 31 different countries from all over the world. The one important thing that did not change from the beginning is the basic concept which has always been the promotion of young stage researchers and their achievements. Every two years the Conference becomes the place where young MSc and PhD students and young doctors meet to exchange their ideas, make new networks and share their knowledge of the topics covering ever expanding field of ceramics. Beside 134 oral presentations given by their peers, the young scientists will have the opportunity to hear 14 invited talks and 1 plenary lecture of the more experienced scientists and experts. The presented topics include many important scientific issues and cutting edge results in ceramics ranging from the theoretical and modelling results over the experimental structural and functional characterizations all the way to the applicative examples and industrial scale production of ceramic materials. In this way, all participants will have the chance to expand their knowledge and strengthen their basic understanding of the various branches of ceramics science covering advance materials, ceramic composites and traditional ceramics. It is important to mention that this year, for the first time, we will have the student competition for the best oral presentation of a young researcher. There will be three awards which are dedicated to the late Prof. Dr. Paolo Nanni.

We want to use this opportunity to thank our sponsors and co-organizers for helping us to successfully prepare the Conference. First of all, we want to thank the JECS Trust Fund of the European Ceramic Society for their strong financial support. Also, we want to mention that the Serbian Ministry of education, science and technological development recognized our conference as an important event and gave their financial endorsement. The financial part of the awards for three best presentations dedicated to Prof. Nanni was sponsored by Prof. Liliana Mitoseriu from University of Iasi, Romania. At the end, we would like to thank to all the people in the local organizing committee and colleagues from YCN who participated in the preparations of the Conference.

Editor

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Novi Sad European youth capital - OPENS

Tourist organization city of Novi Sad

“European youth Capital – Novi Sad 2019” – adding colors to the city

Novi Sad is a small, but compact city in the heart of the Vojvodina region. This vivid city with over 80,000 young people will surprise you with it’s transformative energy, multi-nationality and cultural diversity. For centuries, Novi Sad has been a pioneer and symbol of youth activism, making significant social changes in the history and systematic youth care. But, the 2019 is the year when Novi Sad is European Youth Capital. With OPENS Programme Novi Sad is creating more opportunities for youth by youth, empowering them to become pro-active initiators of positive changes, introducing innovative ideas not only in Novi Sad, but also at national and international level.

We have addressed the needs aiming to improve young people’s lives, to increase participation in the social-political process with a strong feeling of ownership of the development of the city. Young people are directly engaged in programs creation when it comes to youth activities, as well as in their implementation.

There is no fixed pattern previously established based on which one could dance through the whole project of the European Youth Capital. Each city tells its own story. At the same time, this is where the excitement of the challenge lies. At the moment, OPENS, within the existing system, is breaking new grounds towards the construction of a new system in order to make a radical change in innovative ideas.

Perhaps you would not say if led only by first impressions, history or architecture that Novi Sad is a city of young people. As a perfect blend of modern and traditional, openness and tolerance, this city has inspired more than 400,000 people to express themselves through different activities. Each month Novi Sad puts on a new color and becomes over and over again the host of a number of festivals, fairs and celebrations, aimed first of all, at young people. And now, at every corner, you can find the traces of history and blend of cultures. The city whose rhythm you must hear to be able to feel it. The city which celebrates the diversity, energy and activism of young people! This is the city led by young people, students, artists. The city for curious, dynamic and motivating people. This is the city you wish to experience! And this is the European youth capital

At the moment, Novi Sad is on the doorstep of becoming the center in which young people have the main say. If young people are to inherit the Earth, our role and our final goal is not only to be led by this saying, but to make it happen as well.

Photo by Vladimir Velickovic, Omladinska prestonica Evrope Novi Sad 2019

Novi Sad European youth capital - OPENS

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Content

PROGRAMME

PLENARY and INVITED LETURES

ORAL PRESENTATIONS

which should meet the increasingly stringent water quality standards.In this paper, the synthesis, characterization and testing performance of α-Fe_2O_3 nanomaterial for humic acid (HA) sorbtion and photocatalysis experiments has been presented. The $Fe(acac)_3$/silica/PVA nanocomposite was synthesized via sol-gel method at room temperature. The reactant molar ratio between reactants used for the synthesis was: TEOS : H_2O : PVA : $Fe(acac)_3$: MeOH : HNO_3 = 1 : 10 : $1.2 \cdot 10^{-5}$: 0.20 : 18 : 0.01 was used. The synthesized material was characterized by X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR) spectra and transmission electron microscopy (TEM). Textural properties of nanocomposite were analysed using nitrogen sorption/desorption measurements at liquid nitrogen temperature (77K). The morphology of iron oxide nanoparticles was examined by scanning electron microscopy (SEM). The photocatalytic experiments were conducted in a photocatalytic reactor under visible irradiation (VIS light set between 460 and 510 nm). The sorption experiments were carried out under similar conditions of photocatalysis without irradiation. Pseudo-first- and pseudo-second-order kinetic models were tested for fitting the sorption and photocatalysis experimental data. The pseudo-second-order kinetic model fit very well the experimental data for the humic acid (HA) sorption and photocatalysis. The calculated q_e values agree very well with the experimental data, and the correlation coefficients for the pseudo-second-order kinetic model are higher than 0.90. It can be concluded that the photocatalytic effect of α-Fe_2O_3 is manifested in special from kinetics point of view and higher dose led to better sorbtion performance. The results of this study recomend α-Fe_2O_3 as potential material for the design of advanced process to remove HA from water.

OC-117

INFLUENCE OF FERRITES PHASE ON PROPERTIES OF THE BARIUM ZIRCONIUM TITANATE BASED MULTIFERROIC COMPOSITES

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Multiferroic composites with general formula $Ba(Ti_{0.95}Zr_{0.05})O_3$–$Ni_{0.7}Zn_{0.3}Fe_2O_4$/ $CoFe_2O_4$/$Ni_{0.7}Cu_{0.01}Sm_{0.05}Zn_{0.29}Fe_{1.95}O_4$, (BTZr(95-5)–NZF/CF/NCuSmZF) were prepared by mixing chemically obtained different types of ferrites and BTZ(95-5) powders in the planetary mill for 24 h. The optimization of sintering process was performed and powders were pressed and sintered at 1300 °C for obtained composites samples. From X-ray analysis for single phase and composites ceramics can be noticed the formation of crystallized structure of ferrites and barium zirconium titanate. SEM

analyses indicated the formation of two types nanosized grains, polygonal ferromagnetic and rounded ferroelectric grains.

The electrical properties of these materials were investigated using impedance spectroscopy and analysis of ferroelectric measurements. Impedance analysis of all investigated samples has shown different relaxation processes that originated from the grain and grain boundary contributions. The results of polarization vs. electric field measurements have shown the influence of magnetic phase type and its concentration on the ferroelectric properties of the composites. Due to high conductivity of ferrite phases and presence of interfacial polarization, the shapes of these curves differed from the conventional ferroelectric materials.

OC-118

FINITE DIFFERENCE METHOD FOR MODELLING THE DIELECTRIC PROPERTIES OF CERAMIC COMPOSITES

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Composite electroceramics (*e.g.* magnetoelectrics, porous materials, core-shell structures) contain at least two distinct phases with different chemical and physical properties, separated by well-defined interfaces. These interfaces usually collect uncompensated free or bounded charges, due to the fact that the constituent phases have contrasting permittivity and conductivity. Therefore, their effective dielectric properties are not simple *sum properties* derived from ones of the parent phases, but they contain important contributions from the interfaces. To describe the overall electrical response of such inhomogeneous systems, one should consider that interfaces between di-similar materials introduce local field inhomogeneities, which are specific to a microstructure. While the simple effective field theories provide information about the static permittivity, the numerical approaches allow to compute effective dynamic complex permittivity for realistic microstructures.

In the present work, we propose the Finite Difference Method to solve the Poisson equation to compute local electric field, charge distribution at different variable voltages and to extract the time-dependent I(V) and impedance response of ferroelectric-magnetic composite ceramics with different types of compositions and phase interconnectivity. By considering thermally activated mechanisms for conduction (Arrhenius) in the calculation of local charge distributions (in the continuity equation), the frequency and temperature response were simulated and compared with experimental ones for composites based on ferroelectrics ($BaTiO_3$, $Pb(Zr,Ti)O_3$) and ferrites ($CoFe_2O_4$, $NiFe_2O_4$) [1,2]. The model describes the role of different parameters as filling factor, permittivity and conductivity values of the parent phases, frequency and temperature, as