



Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION IV
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials
School of Electrical Engineering and Computer Science of Applied Studies

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 21-23. September 2015

Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION IV
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials
School of Electrical Engineering and Computer Science of Applied Studies

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 21-23. September 2015.

Book title: Serbian Ceramic Society Conference - ADVANCED CERAMICS AND APPLICATION IV: Program and the Book of Abstracts

Publisher:

Serbian Ceramic Society

Editors:

Prof.dr Vojislav Mitić

Prof.dr.Olivera Milošević

Dr Lidija Mančić

Dr Nina Obradović

Technical Editors:

Dr Lidija Mančić

Dr Nina Obradović

Printing:

Serbian Academy of Sciences and Arts,
Knez Mihailova 35, Belgrade

Edition:

140 copies

Photos : Jewelry - Zvonko Petković

Sculptures - Dragan Radenović

Ceramics - Ruža Nikolić

CIP

Dear Colleagues, Dear Friends,

We have great pleasure to welcome you to the Advanced Ceramic and Application Conference IV organized by the Serbian Ceramic Society in cooperation with the Institute for Testing of Materials, Institute of Chemistry Technology and Metallurgy, Institute for Technology of Nuclear and Other Raw Mineral Materials, Institute for Technical Sciences SASA and School of Electrical Engineering and Computer Science of Applied Studies.

Advanced Ceramics play an important role in the European Union's prioritized materials to enable the transition towards to a knowledge-based efficient societies. The chosen Conference topics cover fundamental theoretical research in advanced ceramics, modeling and simulation of technological processes, controlled synthesis of nanomaterials, developing of new composite and hybrid structures which should provide practical realization of the new ideas and brings new quality in everyday life. ACA IV Conference gathers the researchers, engineers, academy staff, artist, specialist and PhD students trying to emphasizes the key innovation activities toward developing the next generation of advanced ceramics products for industry of high-technology, renewable energy sources, environmental efficiency, security, space technology, cultural heritage, prosthesis, etc.

Serbian Ceramic Society has been initiated in 1995/1996 and fully registered in 1997 as Yugoslav Ceramic Society, being strongly supported by American Ceramic Society. Since 2009, it has continued as Serbian Ceramic Society in accordance to the Serbian law procedure. Serbian Ceramic Society is almost the only one Ceramic Society in the South-East Europe, with members from more than 20 Institutes and Universities, active in 16 sessions, by program and the frames which are defined by the American Ceramic Society activities.

Prof. Dr Vojislav Mitić
President of the Serbian Ceramic Society
World Academy Ceramics Member
European Academy of Sciences&Arts Member

Prof. Dr Olivera Milošević,
President of the General Assembly of the
Serbian Ceramic Society
Academy of Engineering Sciences of Serbia Member

General Conference Topics

- Basic Ceramics Science
- Nanostructural, Bio- and Opto-Ceramic Materials and Technologies
- Multifunctional Materials
- Magnetic and Amorphous Materials
- Construction Materials and Eco-ceramics
- Composite Materials, Catalysis and Electrocatalysis
- Artistic Ceramics and Design, Archaeology and Heritage
- Young Researchers
- Sintering processes
 - kinetics
 - microstructure
 - thermodinamics
 - modeling

Conference Co-chairmen:

Prof. Dr. Vojislav Mitić SRB
Prof. Dr. Olivera Milošević SRB
Prof. Dr. Marcel Van de Voorde EU
Prof. Dr. Rainer Gadow GER

Conference Programme Chairs:

Dr. Nina Obradović SRB
Dr. Lidija Mančić SRB

Scientific Committee

Academician Zoran Đurić
Academician Ninoslav Stojadinović
Academician Zoran Popović
Academician Pantelija Nikolić
Academician Miroslav Gašić
Academician Laszlo Forro
Prof. Dr. Vojislav Mitić
Prof. Dr. Marcel Van de Voorde
Prof. Dr. David Johnson
Prof. Dr. Slavcho Rakovsky
Prof. Dr. Jurgen G. Heinrich
Prof. Dr. Masohiro Yoshimura
Dr. Mrityunjay "Jay" Singh
Prof. Dr. Rainer Gadow
Dr. Tatsuki Ohji
Dr. Hua-Tay Lin
Prof. Dr. Paolo Colombo
Prof. Anne Leriche
Prof. Dr. Pavol Šajgalik
Dr. Richard Todd
Dr. Francis Cambier
Dr. Moritz von Witzleben
Dr. Hasan Mandal
Prof. Dr. Hans Fecht
Prof. Dr. Eugene Olevsky
Dr. Eugene Medvedovski
Dr. Dušan Jovanović
Prof. Dr. Olivera Milošević
Prof. Dr. Vladimir Pavlović
Dr. Nina Obradović
Dr. Lidija Mančić
Prof. Dr. Steven Tidrow
Dr. Wilhelm Siemen
Dr. Jonjaua Ranogajec

Dr. Snežana Pašalić
Prof. Dr. Zoran Nikolić
Dr. Zagorka Radojević
Dr. Nadežda Talijan
Dr. Nebojša Romčević
Prof. Dr. Ljubica Pavlović
Prof. Dr. Nebojša Mitrović
Prof. Dr. Ljubiša Kocić
Prof. Zvonko Petković
Dr. Aleksandra Milutinović–Nikolić
Dr. Predrag Banković
Dr. Zorica Mojović
Dr. Dušan Milivojević
Dr. Slaviša Perić
Prof. Dr. Branislav Vlahović
Dr. Radomir Žikić
Prof. Dr. Stevo Najman

Organizing Committee

Prof. Dr. Vojislav Mitić
Dr. Nina Obradović
Dr. Lidija Mančić
Prof. Dr. Vladimir Pavlović
Dr. Dušan Jovanović
Dr. Zorica Lazarević
Prof. Dr. Ljubica Pavlović
Dr. Vesna Paunović
Dr. Darko Kosanović
Dr. Suzana Filipović
Dr. Anja Terzić
Ivan Dugandžić
Zoran Gajić

Sponsors & Endorsements:

Dental BP Pharm, Belgrade (Serbia), Analysis - Lab equipment, Belgrade (Serbia), LMB Soft, Niš (Serbia), INZA, Sarajevo (Bosnia and Herzegovina), SCAN doo. Preddvor (Slovenia), Voda Vrnjci (Serbia), Nissal NewMet (Serbia), Regular Authority of Electronic Media (Serbia), GRAND doo (Serbia) and Imlek (Serbia).

Acknowledgements:

The Conference Organizers are grateful to the Ministry of Education and Science of the Republic of Serbia for financial support, as well as to the Serbian Academy of Sciences and Arts, European Academy of Sciences and Arts, American Ceramics Society, Institute of Technical Sciences of SASA, Archeological Institute of SASA, Institute of Physics UB, Vinča Institute of Nuclear Sciences - Laboratory of Physics (010), Electrical Engineering Institute Nikola Tesla, Technical High School Niš, High School-Academy for Arts and Conservation, Serbian Orthodox Church. We are also grateful to the Dunav Insurance Co, FORMAT doo, and others who support the conference.

P21

The Electrochemical Energy Thermodynamic Parameters and Microstructure Fractal Nature

F. Bastić^{1,2}, V. V. Mitić^{1,2}, Lj. Kocić¹, V. Paunović¹, Z. Mojović³, D. Jovanović³

¹*Faculty of Electronic Engineering, University of Niš, Serbia*

²*Institute of Technical Sciences of SASA, Belgrade, Serbia*

³*Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia*

In the electrochemical scientific area, the new battery systems frontiers ideas, are in the research and development focus. Based on our recent research in the field of electronic ceramics, generally ceramics and materials science, enriched by the researched fractal nature, in this paper we contribute in some fundamental electrochemical laws through fractal corrections. We based this on experiments with BaTiO₃-ceramics and different additives, from 0.01wt% to 1wt% (MnCO₃, Nb₂O₅, CaZr₂O₃, Er₂O₃, Yb₂O₃ and Ho₂O₃) consolidated under the pressure up to 150MPa and processed in the temperatures from 1180°C to 1380°C. We performed SEM and EDS analysis. In this investigation, we contributed with electrochemical thermodynamic fundamental parameters (like T) within the adequate equations fractal corrections. Microstructure fractal nature research directly from experiments confirmed new perspectives in direction of electrochemical bulk fractal microelectronics processes.

P22

Synthesis of anatase nanopowders by sol-gel method and photocatalytic degradation of the pure active substance and commercial product of herbicide clomazone

**Aleksandar Golubović,^a Bojana Simović^b Slavica Gašić,^c Dušan Mijin,^d Aleksandar
Matković,^a Biljana Babić^e**

^a *Centre for Solid State Physics and New Materials, Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade-Zemun, Serbia*

^b *Institute for Multidisciplinary Research, University of Belgrade, Kneza Višeslava 1, 11000 Belgrade, Serbia*

^c *Institute of Pesticides and Environmental Protection, Banatska 31-b, 11080 Belgrade-Zemun, Serbia*

^d *Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11000 Belgrade, Serbia*

^e *Institute of Nuclear Sciences "Vinča", University of Belgrade, 11001 Belgrade, Serbia*

TiO₂ nanopowders were produced by sol-gel technique using TiCl₄ as the starting material. For the preparation of anatase crystalline, this aqueous solution was the mixed with 0.05 M and 0.07 M (NH₄)₂SO₄ solution in a temperature-controlled bath. PH values of the solutions were 7, 8 and 9, respectively. Structural, morphological and surface properties of synthesized TiO₂ nanopowders were investigated by XRD, SEM, and BET measurements. The crystallite sizes determined by XRD measurements had range about 12 nm, and this was confirmed by SEM. The photocatalytic degradation of the pure active substance and

commercial product (GAMIT 4-EC) of herbicide clomazone (0.05 mM) in aqueous suspensions of synthesized and commercial (Degussa P25) TiO₂ were examined under UV radiation. In all experiments the concentration of the catalyst was 0.50 mg mL⁻¹. BET measurements revealed that all synthesized catalyst had mesoporous structure, except the sample synthesized with 0.07 M (NH₄)₂SO₄ and at pH of solution 9 that had small amount of micropores. This sample had the best photocatalytic properties, even better than commercial Degussa P25, and the reason of that is rather the biggest porosity than the combination of micro- and mesoporosity.

P23

Correlation between crystal structure and thermal stability of fire protection coating

**Nina Obradović¹, Nataša Đorđević², Smilja Marković¹, Marija Marković²,
Miodrag Mitrić³**

¹*Institute of Technical Sciences of SASA, Knez Mihailova 35/IV, 11000 Belgrade, Serbia*

²*Institute for Technology of Nuclear and Other Mineral Raw Materials,
Bulevar Franse d'Eperea 86, 11000 Belgrade, Serbia*

³*Vinča Institute of Nuclear Sciences, University of Belgrade, Mike Alasa 12-14,
11000 Belgrade, Serbia*

Fire protection coatings on steel constructions for outdoor conditions on the basis of organic solutions have been analyzed. The first layer of coating is corrosion protection, alkyd paint „PROTHERM STEEL PRIMEPOX“ manufacturer „ITALVIS PROTECT“ Italy. The second layer of coating is an expanding coat for outdoor conditions „PROTHERM STEEL (EXT)“ solvent-based, „AMONNFIRE“ Italy. The third layer is final colors for metal „AMOTHERM STEEL TOP PU SB“ „AMONNFIRE“ Italy. XRD, DTA/TG and FTIR methods were used for sample characterization. It was found that primary and outer layer had very good adhesion. The second layer, for fire protection possesses 2.5 mass % humidity, which resulted in decrease of adhesion. XRD and FTIR analysis showed that those materials are adequate materials for fire protection up to 1000 °C. Principles of fire protection are based on chemical reaction that are taking place in the temperature range 400-700 °C.

P24

Characterization and current–voltage characteristics of solar cells based on the composite of synthesized Sb₂S₃ powder with small band gap and natural dye

Ivana Lj. Validžić, Valentina Janošević, Miodrag Mitrić

*Vinča Institute of Nuclear Sciences, P.O. Box 522, 11001 Belgrade, University of Belgrade,
Serbia*

Recently, we have reported the synthesis and optical and electronic properties of Sb₂S₃ nanowires with small band gap. In order to prove that the synthesized nanowires can be considered as a candidate material for solar cells and in order to obtain *I-V* characteristics, two very simple cells based on synthesized Sb₂S₃ nanowires/natural dye composite were fabricated. Exponential growth of the *I-V* curves after illumination revealed that the cells could work as electricity generators. A better current response was observed for the cell made