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

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 17-19. September 2018.

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Dear Colleagues,

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

Advanced Ceramics today include many old-known ceramic materials produced through newly available processing techniques as well as broad range of the innovative compounds and composites, particularly with plastics and metals. Such developed new materials with improved performances already bring a new quality in the everyday life. The chosen Conference topics cover contributions from a fundamental theoretical research in advanced ceramics, computer-aided design and modeling of a new ceramics products, manufacturing of nanoceramic devices, developing of multifunctional ceramic processing routes, etc. Traditionally, ACA Conferences gather leading researchers, engineers, specialist, professors and PhD students trying to emphasizes the key achievements which will enable the wide speared use of the advanced ceramics products in High-Tech industry, renewable energy utilization, environmental efficiency, security, space technology, cultural heritage, 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.

This year, the conference is dedicated to the memory of Academician Momčilo M. Ristić (1929-2018), Honorary President of the Serbian Ceramic Society and founder of Material Science in our country.

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

Conference Topics

Basic Ceramic Science & Sintering – *in memoriam Momčilo M.Ristić, academician*
Optical, Glass & Electro Ceramics
Nano & Bio Ceramics
Modeling & Simulation
Advanced Ceramics
Heritage, Arts & Design
Guide on Science Writing

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High School-Academy for Arts and Conservation.

incoming solar radiation, which results in a certain energy degree within the Earth's atmospheric composition, and we can roughly describe it as the Earth's climate.

Renewable energy is obtained from natural processes that are constantly renewed. In its various forms, it derives directly from the sun, or from heat generated deep within the Earth. It also includes electricity and heat generated from sources such as sunlight, wind, oceans, hydropower, biomass and geothermal energy, biofuels and hydrogen from renewable sources. Each of these sources has unique characteristics that influence how and where they can be used. Renewable energy sources include: solar energy, wind energy, biomass, biofuel, biogas, geothermal sources, energy of small watercourses, tidal energy, energy of the waves, internal energy of the sea and the ocean.

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Structural characterization of Kalsilite

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Thermally induced phase transformation of K-exchange LTA zeolite is followed in the range from room temperature to 1500 ºC. The frameworks collapse into amorphous intermediate products after heating between 600 and 650 °C. Prolonged heating of the intermediate product over 1100 °C results directly in formation a kalsilite [$\boldsymbol{a}$= 8.1095 (4) Å, $\boldsymbol{b}$ =12.824 (4) Å, $\boldsymbol{c}$ =7.0674 (4) Å, $\boldsymbol{\beta}$ =115.89 °(3)]. The crystale phases of kalsilite in temperature range between 700 and 1500 °C was investigated by X-ray powder analyses.

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Fractal nature Heywang model contribution and $BaTiO_3$-ceramics semiconducting phenomena

Vojislav V. Mitic [1,2], Goran Lazovic[3], Zoran Vosika[1], Vesna Paunovic[1], Sandra Veljkovic[1], Danijel Dankovic[1], Branislav Vlahovic[4]

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Well known material with ferroelectric properties, $BaTiO_3$-ceramics, have many advanced applications. Fractal approach in analyzing of these structures can be one of the solution for investigation of morphology. It is known that a wide range of disordered systems can be characterized by the fractal nature over a microscopic correlation length, and on a small scale the energy transformations are permitted. Due to the lack of energy, priorities of the future frontiers in ce-

ramics science is to expand the knowledge even down to nano and towards new and alternative energy sources. Fractal configuration nature of $BaTiO_3$ and other ceramics is based on phenomena that ceramic grains have fractal shape; there are pores and inter-granular space and there is particles Brownian fractal motion inside the material, during and after sintering, in the form of micro-particles flow, which is the most important. These important facts are in function of further developing of knowledge of energy harvesting and storage.

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Forensic Fractal Nature Applications

Vojislav V. Mitić [1,2], Goran Lazović [3], Ana. S. Radosavljevic-Mihajlović [4], Gordana Mrdak [5], Nenad Kaluđerović [6], Lazar Nešić [7], Dragan Đurđević [8]

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Fractals are fragmented geometric shapes based on each or parts self-similarity. Fractal dimension (FD) is the most important characteristics in fractal nature analysis. There are many fractals applications including the forensic photography. The fractals image reconstruction is very important for modern forensic science. Here we demonstrate the very new original fractal applications in forensic sciences. This is a quite new application in crime investigations specifically in latent fingerprinting within biometric analysis. All of these open a new frontier in falsificates, financial and generally economic crime scene areas.

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One Review on Solid Oxide Fuel Cell Applications

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The fuel cell is a highly efficient electrochemical clean energy conversion device that converts chemical energy into electrical energy by reacting gaseous fuel (H^+) with oxidizing gas (O_2^-) though a solid ion conducting electrolyte with reduced greenhouse gas emission and reduced oil consumption. FC generates high alteration efficiencies as compared to the other available conventional combustion engine mechanical approaches. The working principle of batteries and fuel cell are analogues to each other for the production of electricity. Oxygen pass through the cathode and hydrogen or hydrocarbon fuels supply through the anode, and then the electrochemical reaction takes place at the electrode/electrolyte interface due to the active charge carrier passing