Serbian Ceramic Society Conference

ADVANCED CERAMICS AND APPLICATION IX

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, 20-21. September 2021.

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Dear colleagues and friends,

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

It is nice to host you here in Belgrade in person. As you probably know, Serbia launched a vaccination campaign at the beginning of this year, so up to date more than 50 percent of the adult population has been vaccinated. Since there is no one statistic to compare the COVID19 outbreaks and fears for loved ones in different countries, we believe that we all suffer similarly during this pandemic. That is why we appreciate even more your positive attitude and readiness to travel in this uncertain time. We understand that some of you had to cancel your lectures in the last minute due to the travel limitation in your countries, but we hope that you will come next year. We deeply hope that the ACA IX Conference will be worth remembering, that you will respect all COVID-19 safety measures at SASA building, that you will have a nice time here and that ultimately you will return to your home safely. We are very proud that we succeeded in bringing the scientific community together again and fostering the networking and social interactions around an interesting program on emerging advanced ceramic topics. The chosen topics cover contributions from fundamental theoretical research in advanced ceramics, computer-aided design and modeling of new ceramics products, manufacturing of nanoceramic devices, developing of multifunctional ceramic processing routes, etc.

Traditionally, ACA Conferences gather leading researchers, engineers, specialists, professors and PhD students trying to emphasize the key achievements which will enable the widespread use of the advanced ceramics products in the High-Tech industry, renewable energy utilization, environmental efficiency, security, space technology, cultural heritage, etc.

Serbian Ceramic Society was 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 the Serbian Ceramic Society in accordance with Serbian law procedure. Serbian Ceramic Society is almost the only one Ceramic Society in South-East Europe, with members from more than 20 Institutes and Universities, active in 16 sessions. Part of our members are also members of the Serbian Chapter of ACerS since 2019. Their activities in the organization of this conference is highly recognized. To them and all of you thanks for being with us here at ACA IX.

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
- Nano-, Opto- & Bio-ceramics
- Modeling & Simulation
- Glass and Electro Ceramics
- Electrochemistry & Catalysis
- Refractory, Cements & Clays
- Renewable Energy & Composites
- Amorphous & Magnetic Ceramics
- Heritage, Art & Design

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INV

DTA/TG Analysis And Phase Changes Of Activated Na_2CO_3

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Sodium carbonate material is used as a good sorbent of carbon dioxide from the atmosphere, and has gained increasing importance in environmental protection.In order to enhance its sorption ability, mechanochemicaly activatied sodium carbonate was investigated,and the occurred changes after the activation and the relaxation time in a controlled environment were monitored. Activation was performed in a vibro-mill for 2 and 7 minutes, and the activated samples were placed in an atmosphere of carbon dioxide at a humidity of 95 % for 96 hours, (the relaxation time). Differential thermal and thermogravimetric analyses were applied with the aim of determining the changes that occurred on the activated samples during the relaxation period.The decomposition temperature change of activated Na_2CO_3 samples, mass loss, and conversion degree of Na_2CO_3 to $NaHCO_3$ was monitored depending on activation and relaxation time periods.

INV

Modified glycine nitrate procedure synthesis and properties of nanostructured $Ca_{1-x}Gd_xMnO_3$ (x=0.05; 0.1; 0.15; 0.2)

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Nanocrystallinemanganites $Ca_{1-x}Gd_xMnO_3$(x=0.05, 0.1, 0.15, 0.2) were synthesized by a modified glycine-nitrate procedure. The subsequent studies were focused on the structural, microstructural and magnetic changes of the starting materials induced by calcination and sintering.Thermal treatments of the green bodies were carried out by conventional sintering method.Phase evolution, lattice parameters, chemical composition and magnetic properties were monitored by Differential thermal analysis (DTA), X-ray diffraction

(XRD),Induction coupled Plasma Atomic Emission (ICPES), Scanning electron Microscopy with Energy Dispersive Spectroscopy SEM/EDS and magnetic measurements on Superconducting Quantum Interference Device (Squid).DTA revealed phase transition at ≈918ºC.Chemical analysis has been done by ICPES and EDSwhich confirmed that nominal composition has been attained for all samples.XRD data were analysed by Rietveld refinement which showed that orthorhombic perovskite structure, S.G. *Pnma*(62), persisted with the change of Gd content, while unit cell parameters depended on the composition. Magnetic measurements show that electron doping by Gd^{3+} ions substantially changes $CaMnO_3$ antiferromagnetic behavior. After introduction of Gd^{3+} ions, significant ferromagnetic component appears due to an emergence of double exchange interaction between Mn^{3+}-Mn^{4+} ions. This resulted in appearance of a low temperature plateau in field cooled magnetization diagram as well as in hysteresis loop with the relatively high coercivity up to 2300 Oe.

INV

A multidisciplinary approach to multiferroics

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Multiferroics, materials where spontaneous long-range magnetic and dipolar orders coexist,represent an attractive class of compounds, which combine rich and fascinating fundamentalphysics with a technologically appealing potential for applications in the general area ofspintronics.Among the different types of multiferroic compounds, bismuth ferrite ($BiFeO_3$; BFO) stands out because it is perhaps the only one being simultaneously magnetic and strongly ferroelectric at room temperature.$BiFeO_3$ and $Bi_{1-x}Ho_xFeO_3$ ultrafine nanopowders were synthesized by the hydrothermal method. Here we use simple, low-cost and energy-saving hydrothermal method, which has advantages over the conventional methods. The influence of Ho doping on the crystal structure and magnetic properties of bismuth ferrite (BFO) nanopowders was investigated. The diffraction pattern was recorded at room temperature and atmospheric pressure in the absence of any re-heating of the sample. A fitting refinement procedure using the Rietveld method was performed which showed the incorporation of Ho^{3+} ions in the $BiFeO_3$ crystal lattice, where they substitute Bi^{3+} ions. All the samples belong to *R*3*c* space group.In addition, theoretical investigation using bond valence calculations have been performed in order to mimic pure and Ho doped $BiFeO_3$ compounds produced in the experiment. Various BFOpolymorphs were investigated as function of holmium concentration and final optimization of crystal structures has been performed on *ab initio* level using Density Functional Theory (DFT).Furthermore, electronic and magnetic properties of $BiFeO_3$ were investigated using combination of experimental and theoretical methods.Magnetic behavior of synthesized materials was investigated by