Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION XI
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, 18-20. September 2023.

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Dear colleagues and friends,

We have great pleasure to welcome you to the Advanced Ceramic and Application XI 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. 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 nano-ceramic 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 9 sessions..

Dr. Nina Obradović
President of the Serbian Ceramic Society

Dr. Suzana Filipović
President of the General Assembly of the Serbian Ceramic Society

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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P40

New opportunities for material characterization using photoacoustics methods

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The photoacoustic effect is the result of sound waves forming as a result of the interaction between matter and light. A photoacoustic signal is the sound produced when a sample of any aggregate state interacts with the modulated light that illuminates that sample. Photoacoustics is a branch of photothermal science that bases its research on this effect. The thermodiffusion and thermoelastic components, which represent this signal as two fundamental components, undoubtedly contain information about the initial signal. The thermoelastic component can be compared to low-pass RC filters and represented by Bode diagrams of amplitude and phase.Using Bode diagrams, the cut-off frequency of the photoacoustic signal may be determined andis given as a function of the sample thickness. The sample is often positioned on top of themicrophone and surrounded by air in a photoacoustic setup for material characterisation. Theinfluence of the light source causes a temperature difference on the illuminated and non-illuminated side. The objective of determining the cut-off frequency is to develop a new system for characterizing materials in which they are thought of as surface absorbers. Aluminum and silicon samples were utilized in the experiment, and it was demonstrated that the analogy is accurate no matter which material is under consideration.

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Electrochemical characteristics of V_2O_5/rGO synthesized by sol-gel method in water electrolyte

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Today, rechargeable Li- ion batteries have widespread use as power sources. However, the organic electrolytes used in these batteries are toxic, so the use of aqueous electrolytes is preferred. Vanadium pentoxide has been intensively studied as a cathode material for use in batteries with aqueous electrolytes. In this work, the V_2O_5 composite with reduced graphene oxide was synthesized by a simple sol-gel synthesis. Material was characterized by XRD, thermal analysis and optical microscope. The electrochemical properties of the composite material were examined by the method of cyclic voltammetry at different polarization speeds.

Aqueous electrolytes $LiNO_3$, $NaNO_3$ and $Mg(NO_3)_2$ were used. These characteristics were correlated to determine for which type of batteries the tested composite can be used, as well as how reduced graphene oxide affects the stability and capacity value of V_2O_5.

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The effect of stabilizing agents on physicochemical properties and cell viability of composite hydrogel Collagen/Selenium nanoparticles

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As the most abundant protein in the human body, collagen has been drawing the attention of many researchers from the biomedical field for a long time. It can be found as a constituent in versatile commercially available products. In the hydrogel form, it is used often in designing novel platforms for drug delivery or cell growth. On the other side, Selenium nanoparticles (SeNPs) are a relatively new selenium form that has proven records in enhanced antimicrobial, anticancer, antiviral, antioxidative activity, and reduced toxicity compared to other selenium forms. Therefore, in this work, we have examined the effects of different stabilizing agents, used in the preparation of selenium nanoparticles, on the formation, structure, and biocompatibility of composite hydrogel Collagen/SeNPs. Differential scanning calorimetry (DSC), Fourier-transform infrared spectroscopy (FTIR), optical microscopy, and cell viability (MTT assay) were used for the characterizations of obtained hydrogels. SeNPs were synthesized by the chemical reduction in the form of colloidal solutions using (i) bovine serum albumin, (ii) chitosan, and(iii) glucose as stabilizing agents.

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Influence of $BaTiO_3$ Filler on Tensile Strength of Complex Multifunctional Systems Based on Polyvinylidene Fluoride and Bacterial Nanocellulose

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This study aimed to analyze the influence of $BaTiO_3$ (BT) filler on the tensile strength of complex multifunctional films. On the one hand, the films consisted of PVDF and bacterial nanocellulose functionalized with Fe_3O_4 magnetite, while on the other hand, a comparative investigation was conducted on films with the same components (PVDF/BNC/Fe_3O_4) but with the addition of BT. Special focus was placed on mechanical characteristics using a tensile testing apparatus. The experimental research involved preparing samples with varying BT content - films of BNC/Fe_3O_4/PVDF and films of BNC/Fe_3O_4/BT. The morphology of the