Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION X
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, 26-27. September 2022.

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Dear colleagues and friends,

We have great pleasure to welcome you to the Advanced Ceramic and Application X 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. This Conference is dedicated to Prof. Dr. Vojislav Mitić, president of Serbian ceramic society, who passed away in September 2021.

It is nice to host you here in Belgrade in person. As you probably know, Serbia launched a vaccination campaign at the beginning of last year, so up to date more than 70 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 deeply hope that the ACA X 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 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. 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 X.

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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P1 **26.09.2022 (16.30-17.00 installation), 17.00-18.30 poster session CLUB SASA**

Flat band potentials and photocatalytic activities of alumina/zirconia composite ceramics

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Coupled oxide ceramic materials possess attractive properties, such as high surface areas, tunable pore size and shapes, various crystal structures, and a multitude of compositions, which endow them with potential applications in various areas of science and technology. Among these, porous zirconia-based ceramic materials, which can be considered as semiconductors with high band gap energy of ~5eV, have been the subject of intense research because of the potential new extensive use in photocatalytical degradation of organic pollutants.
In the scope of this study mesoporous coupled alumina/zirconia composites were synthesized via the sol-gel method, followed by heat treatment at 500°C, for 5h. The XRD pattern of composites has shown that the addition of zirconia disrupts the crystallinity of alumina. The composites with higher zirconia content are characterized by peaks of the tetragonal zirconia phase. On the basis of the calculated flat band potentials from Mott-Schottky plots and optical band gaps, the conduction and valence band potentials were estimated for the composite semiconductors. Photocatalytic activity of synthesized samples in the process of degradation of trichlorophenol was obtained and correlated with band potentials and optical properties.

P2

The electrochemical behavior of ion-exchange cu-alumina

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Alumina is often used as a support for various types of catalysts or electrocatalyst. The role of alumina was to provide a stable and large surface area for the active metal or metal oxide. As insulating material with high resistivity, alumina was considered to be electrochemically inactive. However, surface groups in the alumina enable a distinct electrochemical response that greatly depends on the type and the number of surface groups present in different alumina types.
The aim of this study was to investigate the response of different alumina types modified by cooper. Two alumina oxyhydrates with different water content, 3mol H_2O/ mol Al_2O_3 (gibbsite) 0.6 mol H_2O/ mol Al_2O_3 (α,γ-alumina phase), were used in this study. Copper modified alumina samples were prepared by ion exchange with a solution of $CuSO_4*5H_2O$. Cu-alumina samples were dried at at 110 ^oC overnight. The obtained samples were used as modifiers of the carbon paste electrode. Their electrochemical response toward

ferricyanide/ferrocyanide redox probe was evaluated by cyclic voltammetry and correlated with the type of alumina and the amount of copper in impregnated alumina. The possibility of the application of Cu-alumina as an electrochemical sensor was tested.

P3

P-channel power VDMOSFETs under the influence of radiation and static/pulsed NBT stress

Sandra Veljković[1], Nikola Mitrović[1], Snežana Đorić-Veljković[2], Vojkan Davidović[1], Ivica Manić[1], Snežana Golubović[1], Aneta Prijić[1], Zoran Prijić[1], Goran Ristić[1], Danijel Danković[1]

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In this study, the effects of static and pulsed negative bias temperature (NBT) stress on the irradiated commercial p-channel VDMOS transistors are investigated, as well as the effects of radiation on NBT stressed transistors. Also, the relative contributions of gate oxide charge - N_{ot} and interface traps - N_{it} to threshold voltage shifts are researched to further highlight the effects of these stresses on power devices. The static NBT stress interval before irradiation has a slightly higher effect on the radiation response of power VDMOS transistors when irradiation is performed without the gate voltage. In light of the fact that the analyzed components are more likely to operate in the dynamic mode than in the static mode in practice, subsequent investigation focused on the results obtained during a pulsed NBT stress after irradiation. Since only high temperature is applied during the pulse-off state, the effects of N_{ot} neutralization and N_{it} passivation, which are often associated to annealing, are intensified for components subjected to the pulsed NBT stress following irradiation, compared to components subjected to the static NBT stress. It has been noticed that the reduction of the threshold voltage shift during the pulsed NBT stress is considerably greater than during the static NBT stress in devices that have been previously irradiated with the applied gate voltage.