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

Publisher:
Serbian Ceramic Society

Editors:
Dr. Nina Obradović
Dr. Lidija Mančić

Technical Editors:
Dr. Adriana Peleš Tadić
Dr. Jelena Živojinović

Printing:
Serbian Ceramic Society, Belgrade, 2023.

Edition:
120 copies

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

666.3/.7(048)
66.017/.018(048)

SRPSKO keramičko društvo. Conference Advanced Ceramics and Application : New Frontiers in Multifunctional Material Science and Processing (11 ; 2023 ; Beograd)

Program ; and the Book of abstracts / Serbian Ceramic Society Conference Advanced Ceramics and Application XI New Frontiers in Multifunctional Material Science and Processing, Serbian Academy of Sciences and Art Serbia, Belgrade,18-20.September 2023. ; [editors Nina Obradović, Lidija Mančić]. - Belgrade : Serbian Ceramic Society, 2023 (Belgrade : Serbian Ceramic Society). - 90 str. : ilustr. ; 30 cm

Tiraž 120.

ISBN 978-86-905714-0-6

а) Керамика -- Апстракти б) Наука о материјалима -- Апстракти

COBISS.SR-ID 122849545

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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Sponsors:

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Institut za tehnologiju nuklearnih i drugih mineralnih sirovina

ORL7

Optimization of processing parameters for high entropy dual phase ceramics

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High entropy carbide/boride (HEC/HEB) ceramics are materials with a wide range of possible applications in harsh environments due to their good mechanical properties, oxidation resistance, and thermal stability. They are usually formed by the solid solutioning of four or more transition metals (TM) in the boride and carbide lattice. In this research, boro/carbothermal reduction was used to form an individual diboride and carbide phases from oxide mixtures. The stoichiometry of the reaction was varied in order to synthesize pure dual phase ceramics. The reacted powders were spark plasma sintered (SPS) or hot pressed (HP), using a two-step process, to produce dense ceramics and to develop the solid solutiosn. Ceramics processed by SPS still contained residual oxides, while ceramics produced by HP were nominally phase-pure high entropy dual phase materials. Preferential segregation of the TMs was detected by energy dispersive spectroscopy. Vickers hardness measurements confirmed that the highest hardness was obtained for specimens densified by HP at 1950°C that contained no residual oxides and had the smallest grain size. The hardness increased from 25.7 ± 0.2 GPa to 33.6 ± 2.2 GPa with decrease applied load from 9.81N to 0.49N, respectively.

ORL8

Kinetics and mechanism study of photocatalytic degradation using heterojunction semiconductors

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Photocatalytic processes have been recognized as promising and sustainable methods for pollutant degradation and energy conversion. Due to the simplicity of the process, capacity for using renewable and pollution-free solar energy, mild reaction conditions, reasonable reaction time, complete pollutant degradation, no harmful byproducts, and cost-effectiveness, photocatalytic degradation processes are more promising than conventional physical methods. Due to its favorable properties, TiO_2 semiconductor has been used as an ideal candidate for photocatalytic reactions. However, large band gap, fast e^-/h^+ recombination, and low light harvesting efficiency are the main obstacles that restrict its practical application. Using g-

C_3N_4 semiconductor in combination with $TiO_2$is an excellent strategy to enhance the photocatalytic activity under visible light irradiation. In this study, g-C_3N_4/TiO_2photocatalyst was successfully synthesized and used in single and simultaneous photodegradation of cationic Methylene Blue and anionic Orange G dyes. To examine the heterojunction between g-C_3N_4 and TiO_2 and the mechanism of the transport pathway of photogenerated e^-/h^+, the photoluminescence spectra and radical scavenger study were applied. The present research offers a novel approach in reaction mechanism analysis for degradation of dye pollutants in single/mixed solutions and suggests a strategy for determination of heterojunction type in g-C_3N_4/TiO_2 systems.

Acknowledgement: This work was financially supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Grant No. 451-03-47/2023-01/200026 and 451-03-47/2023-01/200135).

ORL9

The lumped approach in drying modeling of roofing tiles – variable effective diffusivity determination

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In this paper, the drying modeling of roofing tiles was done using a "lumped" approach. In other words, several forces that are influencing internal moisture transport are combined to create effective moisture diffusivity. For this reason, the effective diffusivity coefficient was added to Cranck's diffusion equation. In their earlier works, the authors published the solution to the diffusion equation, which assumes that effective diffusivity is constant. It was demonstrated that, particularly if shrinkage is not taken into account during the computation stage, the simulated drying curves differ from the experimental results. The next step was to ascertain the time-dependent effective diffusivity and to more precisely anticipate the drying kinetic. The general functional relationship between effective moisture diffusivity and Fourier number was first determined to fulfill this assignment. Experimental proof of the proposed model was provided. Less than 3% of the outcomes from the simulation and the experiment deviated from each other. This was a resounding affirmation that effective diffusivity is not constant during drying and that all internal transport mechanisms are observable in their time-dependent relation.

Acknowledgments: This investigation is supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (Contract No. 451-03-47/2023-02/200012).