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.

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, 26-27th September 2022.

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

Publisher:
Serbian Ceramic Society

Editors:
Dr. Nina Obradović
Dr. Lidija Mančić

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

Printing:
Serbian Ceramic Society, Belgrade, 2022.

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 (10 ; 2022 ; Beograd)
Program ; and the Book of abstracts / Serbian Ceramic Society Conference Advanced Ceramics and Application X New Frontiers in Multifunctional Material Science and Processing, Serbia, Belgrade, 26-27. September 2022. ; [editors Nina Obradović, Lidija Mančić]. - Belgrade : Serbian Ceramic Society, 2022 (Belgrade : Serbian Ceramic Society). - 96 str. : ilustr. ; 30 cm

Tiraž 120.

ISBN 978-86-915627-9-3

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

COBISS.SR-ID 74827529

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

Conference Programme Chairs:

Dr. Nina Obradović SRB
Dr. Lidija Mančić SRB

Conference Co-chairs:

Prof. Dr. Olivera Milošević SRB
Prof. Dr. Rainer Gadow GER

Scientific Committee

Academician Antonije Đorđević
Academician Zoran Popović
Dr. Nina Obradović
Dr. Lidija Mančić
Prof. Dr. Rainer Gadow
Prof. Dr. Marcel Van de Voorde
Prof. Dr. Wei Pan
Prof. Dr. Reuben Jin-Ru Hwu
Dr. Richard Todd
Prof. Dr. Hans Fecht
Prof. Dr. Olivera Milošević
Prof. Dr. Vladimir Pavlović
Prof. Dr. Bojan Marinković
Dr. Takashi Goto
Dr. Steven Tidrow
Dr. Snežana Pašalić
Prof. Dr. Zoran Nikolić
Dr. Nebojša Romčević
Dr. Zorica Lazarević
Dr. Aleksandra Milutinović–Nikolić
Dr. Predrag Banković
Dr. Zorica Mojović
Dr. Nataša Jović Jovičić
Prof. Dr. Branislav Vlahović
Prof. Dr. Stevo Najman
Prof. Dr. Vera Pavlović
Dr. Nataša Đorđević
Prof. Dr. Aleksandar Marinković
Dr. Sanja Stojanović
Prof. Dr. Nebojša Mitrović
Dr. Suzana Filipović
Dr. Darko Kosanović
Dr. Dušan Božanić

Organizing Committee

Dr. Nina Obradović
Dr. Lidija Mančić
Academician Antonije Đorđević
Dr. Smilja Marković
Dr. Ivana Dinić
Dr. Marina Vuković
Dr. Suzana Filipović
Dr. Anja Terzić
Dr. Milica V. Vasić
Dr. Maja Pagnacco
Dr. Dalibor Marinković
Prof. Dr. Nebojša Mitrović
Prof. Dr. Vladimir Buljak
Prof. Dr. Branislav Ranđelović
Prof. Dr. Vesna Paunović
Prof. Dr. Vera Petrović
Dr. Milica Marčeta Kaninski
Dr. Darko Kosanović
Dr. Jelena Vujančević
Dr. Jelena Živojinović
Dr. Adriana Peleš Tadić
Dr. Maria Čebela
Dr. Vesna Lojpur
Dr. Biljana Đorđević
M. Sci. Isaak Trajković

Sponsors:

Analysis - Lab equipment,
Turistička organizacija Beograda, Inovacioni centar Mašinskog fakulteta,
Institut za ispitivanje materijala, Jeol
Institut za tehnologiju nuklearnih i drugih mineralnih sirovina, Kefo, SCAN

Acknowledgements:

Ministry of Education, Science and Technological Development RS
Serbian Academy of Sciences and Arts
Institute of Technical Sciences of SASA, Institute of Physics BU
American Ceramics Society – Serbian Chapter
Hotel Palace, Shenemil

PL2

Zeta phase tantalum carbide: a high strength, high toughness ceramic

William G. Fahrenholtz

Missouri University of Science and Technology, Department of Materials Science and Engineering, 222 McNutt Hall; 1400 N. Bishop Avenue, Rolla, MO 65409, United States

Zeta-phase carbides have an unusual combination of strengths above 500 MPa and fracture toughness values exceeding 10 MPa•$m^{1/2}$. These ceramics have a narrow range of compositional stability and typically decompose to other carbides when heated above a critical temperature. In the tantalum-carbon system, the zeta phase is stable below ~2400°C with a tantalum to carbon ratio of about 3 to 2. Room temperature strength and fracture toughness values had previously been reported. Recent research in our laboratory utilized reaction-based processing to produce zeta phase tantalum carbide ceramics that were nearly fully dense and contained up to ~96 wt% of the zeta phase. These ceramics exhibited metallic conductivity with electrical resistivity of ~160 ohm•cm at room temperature. The thermal conductivity was about 10 W/m•K, which is about 1/3 of the value of TaC. At elevated temperatures, the strength decreased from about 700 MPa at room temperature to about 180 MPa at 1600°C while the fracture toughness decreased from about 10 MPa•$m^{1/2}$ to 5 MPa•$m^{1/2}$ over the same temperature range. Based on its unusual mechanical behavior, zeta-phase tantalum carbide can be machined using conventional hardened steel tools. The presentation will discuss the mechanisms underlying these interesting properties.

PL3

Alumina as electrode material

Zorica Mojović

University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Njegoševa 12, 11000 Belgrade, Serbia

Alumina (aluminium oxide or Al_2O_3) is one of the well-known ceramic materials. This material is widely used as abrasives, in the production of refractory products and glass, advanced ceramics, medical applications, and military and electronics applications. It is also used as a catalyst and/or catalyst support for various catalytic reactions. Alumina found its various applications in the field of electrochemistry as well: as solid electrolyte, anodic membrane, and corrosion coatings are the most prominent of them.
Most intriguingly, alumina although known as an insulating material, is also used as the electrode material. In recent years it was noticed that the properties of the glassy carbon electrode were enhanced after polishing the electrode with γ-alumina. The morphology and structure of Al_2O_3 particles used for the electrode polishing influenced electrode performances. The investigations were continued with the alumina applied at the surface of the electrode. Strong apparent catalysis of the catechol redox process was noticed in the presence of alumina on the electrode surface leading to the conclusion that the alumina on the electrode surface can act as a catalyst for oxidative process involving a proton-coupled electron-transfer process.