



**Serbian Ceramic Society Conference  
ADVANCED CERAMICS AND APPLICATION VII  
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, 17-19. September 2018.**

**Serbian Ceramic Society Conference**  
**ADVANCED CERAMICS AND APPLICATION VII**  
**New Frontiers in Multifunctional Material Science and Processing**

*/ Serbian Ceramic Society / Institute of Technical Science 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, 17-19. September 2018**

**Book title:**

Serbian Ceramic Society Conference -  
ADVANCED CERAMICS AND APPLICATION VII  
Program and the Book of Abstracts

**Publisher:**

Serbian Ceramic Society, Belgrade, 2018.

**Editors:**

Prof. dr Vojislav Mitić  
Dr Lidija Mančić  
Dr Nina Obradović

**Technical Editors:**

Ivana Dinić  
Marina Vuković

**Printing:**

Serbian Ceramic Society, Belgrade, 2018.

**Edition:**

130 copies

CIP - Каталогизacija 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 (7 ; 2018; Beograd)

Program ; and the Book of Abstracts / Serbian Ceramic Society

Conference Advanced Ceramics and Application VII : New Frontiers in Multifunctional Material Science and Processing, Serbia, Belgrade, 17-19. September 2018 ; [organized by] Serbian Ceramic Society ... [et al.] ; [editors Vojislav Mitić, Lidija Mančić, Nina Obradović]. - Belgrade : Serbian Ceramic Society, 2018 (Belgrade : Serbian Ceramic Society). - 106 str. : ilustr. ; 30 cm

Tiraž 130.

ISBN 978-86-915627-6-2

a) Керамика - Апстракти b) Наука о материјалима - Апстракти c) Наноматеријали - Апстракти

COBISS.SR-ID 267569676



Dear Colleagues,

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

Advanced Ceramics today include many old-known ceramic materials produced through newly available processing techniques as well as broad range of the innovative compounds and composites, particularly with plastics and metals. Such developed new materials with improved performances already bring a new quality in the everyday life. The chosen Conference topics cover contributions from a fundamental theoretical research in advanced ceramics, computer-aided design and modeling of a new ceramics products, manufacturing of nanoceramic devices, developing of multifunctional ceramic processing routes, etc. Traditionally, ACA Conferences gather leading researchers, engineers, specialist, professors and PhD students trying to emphasize the key achievements which will enable the wide spread use of the advanced ceramics products in High-Tech industry, renewable energy utilization, environmental efficiency, security, space technology, cultural heritage, etc.

Serbian Ceramic Society has been 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 Serbian Ceramic Society in accordance to the Serbian law procedure. Serbian Ceramic Society is almost the only one Ceramic Society in the South-East Europe, with members from more than 20 Institutes and Universities, active in 16 sessions, by program and the frames which are defined by the American Ceramic Society activities.

This year, the conference is dedicated to the memory of Academician Momčilo M. Ristić (1929-2018), Honorary President of the Serbian Ceramic Society and founder of Material Science in our country.

**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 – *in memoriam Momčilo M.Ristić, academician*

Optical, Glass & Electro Ceramics

Nano & Bio Ceramics

Modeling & Simulation

Advanced Ceramics

Heritage, Arts & Design

Guide on Science Writing

### Conference Co-chairmens:

Prof. Dr. Vojislav Mitić SRB

Prof. Dr. Olivera Milošević SRB

Prof. Dr. Marcel Van de Voorde EU

Prof. Dr. Rainer Gadow GER

### Conference Programme Chairs:

Dr. Lidija Mančić SRB

Dr. Nina Obradović SRB

### Scientific Committee

Academician Zoran Đurić SRB

Academician Ninoslav Stojadinović SRB

Academician Zoran Popović SRB

Academician Miroslav Gašić SRB

Academician Laszlo Forro CHE

Prof. Dr. Vojislav Mitić SRB

Prof. Dr. Marcel Van de Voorde EEZ

Prof. Dr. David Johnson GBR

Prof. Dr. Jurgen G. Heinrich DEU

Prof. Dr. Masohiro Yoshimura JPN

Dr. Mrityunjay "Jay" Singh USA

Prof. Dr. Rainer Gadow DEU

Prof. Dr. Pavol Šajgalik SVN

Dr. Richard Todd GBR

Dr. Moritz von Witzleben DEU

Prof. Dr. Hans Fecht DEU

Dr. Dušan Jovanović SRB

Prof. Dr. Olivera Milošević SRB

Prof. Dr. Vladimir Pavlović SRB

Dr. Nina Obradović SRB

Dr. Lidija Mančić SRB

Prof. Dr. Steven Tidrow USA

Dr. Takashi Goto, Japan

Dr. Jonjaua Ranogajec SRB

Dr. Snežana Pašalić SRB

Prof. Dr. Zoran Nikolić SRB

Dr. Zagorka Radojević SRB

Dr. Nebojša Romčević SRB

Dr. Zorica Lazarević SRB

Prof. Dr. Ljubica Pavlović SRB

Prof. Dr. Nebojša Mitrović SRB

Prof. Dr. Ljubiša Kocić SRB

Dr. Aleksandra Milutinović–Nikolić SRB

Dr. Predrag Banković SRB

Dr. Zorica Mojović SRB

Dr. Dušan Milivojević SRB

Dr. Miomir Korać SRB

Prof. Dr. Branislav Vlahović USA

Dr. Radomir Žikić SRB

Prof. Dr. Stevo Najman SRB

Dr. Biljana Djordjević SRB

## **Organizing Committee**

Prof. Dr. Vojislav Mitić SRB

Dr. Lidija Mančić SRB

Dr. Nina Obradović SRB

Prof. Dr. Vladimir Pavlović SRB

Dr. Dušan Jovanović SRB

Dr. Vesna Paunović SRB

Dr. Darko Kosanović SRB

Dr. Anja Terzić SRB

Dr. Suzana Filipović SRB

Dr. Vladimir Blagojević SRB

Dr. Marina Vuković SRB

Dr. Milica Ćurčić SRB

Ivana Dinić SRB

## **Sponsors & Endorsements:**

**Analysis - Lab equipment, Belgrade (Serbia), HARDER digital SOVA d.o.o. Niš**  
Exchange office „Hulk“, LMB Soft, Niš (Serbia), SCAN doo. Preddvor (Slovenia),  
Voda Vrnjci (Serbia) and Turistička organizacija Beograd

## **Acknowledgements:**

The Conference Organizers are grateful to the  
**Ministry of Education and Science of the Republic of Serbia**  
for financial support, as well as to the  
Serbian Academy of Sciences and Arts,  
European Academy of Sciences and Arts,  
American Ceramics Society,  
Institute of Technical Sciences of SASA,  
Archeological Institute of SASA,  
Institute of Physics UB,  
Vinča Institute of Nuclear Sciences - Laboratory of Physics (010),  
Electrical Engineering Institute Nikola Tesla  
High School-Academy for Arts and Conservation.



fluoroapatite ( $\text{Ca}_{10}(\text{PO}_4)_6\text{F}_2$ ) was investigated. Fluoroapatite powders were produced by co-precipitation method from solution of initial components. Samples were manufactured by sintering process on air condition during 6 hours at  $1200^\circ\text{C}$  and possessed maximal apparent density values (90-92 %). The increase of thermal treatment process up to 9 hours was resulted in the transfer of  $\text{Ca}_{10}(\text{PO}_4)_6\text{F}_2$  sample material from crystal to glass-ceramic state. Any changes in phase and structure composition of crystal fluoroapatite samples were not observed by XRD and SEM methods after the electron irradiation process. On the contrary, a lot of gas bubbles of spherical form were detected in glass-ceramic material sample after the electron irradiation process. Results of leaching tests in water conditions demonstrated any principal changes of corrosion resistance of crystal fluoroapatite material after the electron irradiation. Stability of physical-chemical properties of synthesized crystal fluorapatite after electron irradiation is challenging for further application of materials based on fluorapatite structures as promising matrices for HLW immobilization.

## P26

### **Polyvinyl alcohol PVA with poly ethylene Glycol PEG added as a binder for the powder compaction**

Nebojša Labus<sup>1</sup>, Smilja Marković<sup>1</sup>, Maria Vesna Nikolić<sup>2</sup>,  
Jugoslav Krstić<sup>3</sup>, Vlada Pavlović<sup>1</sup>

<sup>1</sup> *Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Belgrade, Serbia*

<sup>2</sup> *Institute of Multidisciplinary Research, Kneza Višeslava 1, 11000 Belgrade, Serbia*

<sup>3</sup> *Univerzitet u Beogradu, Institut za hemiju, tehnologiju i metalurgiju - IHTM, Beograd*

During the compaction of the powder mixture of  $\text{ZnO}$  and  $\text{Mn}_2\text{O}_3$  ( $\text{MnCO}_3$ ) and  $\text{Fe}_2\text{O}_3$  compacts were found fragile for further handling. Poly vinyl alcohol PVA was used as a binder in an unusual 20% PVA content. We made as well 2% PVA with 0.6% Poly ethylene glycol PEG and 20% PVA with 6 % PEG. Binder was wrapped over the powder by suspension forming in the polymer water solution and drying afterwards until all water content evaporates. On these obtained powders employed characterization techniques were: Fourier transformed Infra red FTIR spectra with ATR attenuated total reflection technique as well as differential thermal analysis DTA on the device with low temperature sensitivity and TEM transmission electron microscopy. All binder concentrations gave compacts with good mechanical properties, that can be handled with ease but with adding, a PEG as plasticizer the operating of the anvil and piston were extremely difficult due to friction.