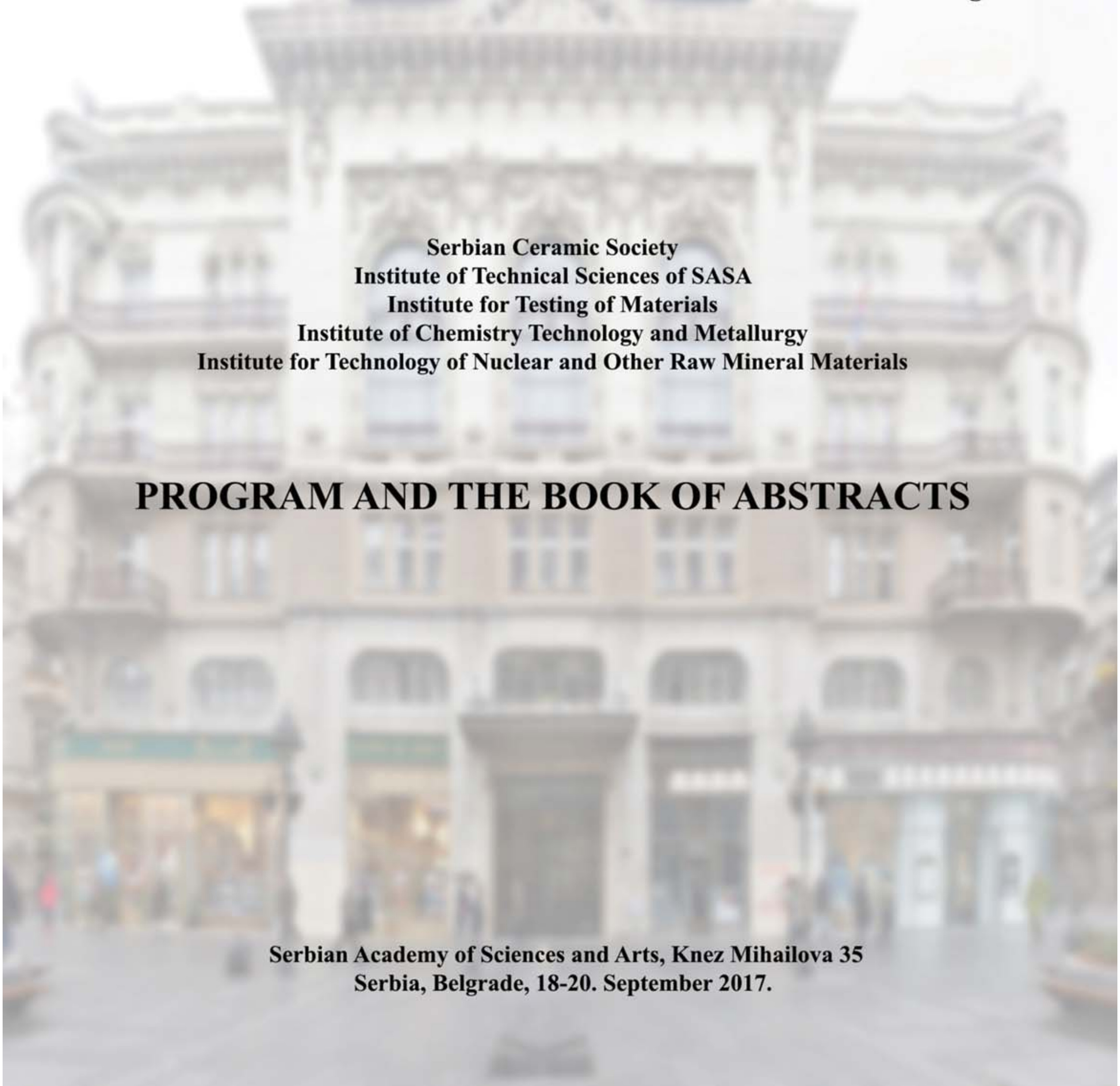
Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION VI
New Frontiers in Multifunctional Material Science and Processing



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 2017.

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Dear Colleagues,

We have great pleasure to welcome you to the Advanced Ceramic and Application Conference VI 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 emphasizes the key achievements which will enable the wide speared use of the advanced ceramics products in High-Tech industry, renewable energy utilization, environmental efficiency, security, space technology, cultural heritage, prosthesis, 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.

For the first time Advanced Ceramic and Application Conference hosting delegations from Republics of Ghana, Nigeria, Niger and Cameroon with the idea to connect, share and provide positive influence to the scientific and industrial communities all around world.

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 Science & Sintering of Ceramics
- Nano, Bio- & Opto Ceramic
- Electro & Multifunctional Ceramics
- Magnetic, Catalytic & Composite Materials
- Renewable Energy, Heritage & Archeology
- Industrial Talks

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

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INV-BMS2
Iron oxide functionalized wollastonite based adsorbents for oxyanions removal

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Iron oxide functionalized porous wollastonite (WL) was used as adsorbent for oxyanions (arsenic, chromate and phosphate ions) removal from natural water. Porous WL was fabricated from calcium carbonate and siloxane by a pressureless sintering process and by using low molecular weight nano-sized poly(methyl methacrylate) (PMMA) as pore forming agent. The precipitation of iron oxide nanoparticles was carried out directly by a polyol-medium solvothermal method using iron(III) chloride hexahydrate and via (3-aminopropyl)trimethoxysilane cross-linker by solvent/nonsolvent system method using iron(II) sulphate heptahydrate. The effectiveness of WL synthesis and modification was confirmed applying FTIR, Raman, XRD and SEM analysis. Comparative adsorption study, related to benefits of WL modification method for the iron oxide functionalized WL based adsorbent for oxyanion removal was conducted. In a batch test, the influence of modified WL mass and contact time on adsorption efficiency of arsenic, chromate and phosphate ions were studied.

INV-BMS3
Dilatometer as a scientific tool

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Dilatometry is defined as the dimensional change of a solid specimen recorded during temperature schedule. Set of data obtained in such a manner are known as dilatogram. Dilatograms for different sort of materials represent an important trace for deduction of other materials properties than volume. Property parameters directly appointable from the dilatogram graph are: thermal expansion coefficient for the temperature interval, glass transition temperature, phasetransition temperature, sintering shrinkage and sintering temperature for maximal shrinkage rate, crystallization point temperature for amorphous bulk metallic glasses, defect annealing temperature. From dilatometric data we can also calculate more complex values such as the sintering activation energy, deduce sintering kinetic

mechanisms, for the phase transition kinetic parameters and phase composition, defect concentration, materials thermal expansion coefficient at a particular temperature, solid state reaction kinetic parameters. Dilatometric devices regarding the construction are divided into contact and non contact ones, for they physically exert force on the specimen or not. Furthermore, contact dilatometric devices can be ascribed due to their construction as vertical and horizontal. This categorization leads to different and changeable contact force on the specimen. Vertical dilatometers usually use higher and temporarily changeable forces applied on the specimen. They can be, with suitable equipment, used for other mechanical properties determination than expansion, such as compressibility, tension or inflection. Non contact devices are divided into interferometric and optical. Interferometric ones use a two laser beams construction where for the length change measuring they count the number of wave lengths that are formed as a path difference between two beams. Optical devices, however, uses monochromatic light projected on the specimen that forms shadow recorded on an optical sensor. Obtained images are then analyzed for the specimen`s dimensional change.

INV-NOP1
Development of dense and controlled porous nano-structured biomaterials based on hydroxyapatite

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The human bones and teeth as natural composites contain nano-sized hydroxyapatite (HAp) forms as main inorganic phase which gives the sufficient mechanical properties to human hard tissue. The processing of nano-grained sintered HAp bioceramic forms and nano-structured controlled porous scaffolds based on HAp are two directions of development of biomaterials applicable in different regenerative purposes in dental, maxillofacial and orthopedic practice and also in the field of tissue engineering. The first part of the research was based on the investigation of possibilities for processing of nano-grained dense HAp, starting from nano-powder, using the different approaches for limiting of the grain size, different sintering techniques and different concept of temperature regimes. The presence of nano-sized grains in dense microstructure affected improvement in the mechanical properties and *in vitro* biocompatibility. *In vivo* investigations indicated that reducing of the grain size could improve the structure/quality of tissue-material interfaces and have potential to affect the osseointegration. It was also showed that nano-grains in full dense two-step microwave sintered HAp were not a guarantee, but in many cases are sufficient prerequisite for improvement of mechanical properties. The second part of the study was based on the improvement of the properties of composite scaffolds, with the amount of calcium phosphate phase similar to natural bone, by controlling of doping and shape of β-TCP bioactive particles.