



**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.**

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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*  
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## 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

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## Kinetics and thermodynamics of zinc(II) ions adsorption from aqueous solution on natural Romania zeolite

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Adsorption performances of natural zeolite, originating from Mare Baia, Romania, was tested in this study. The main constituent of used adsorbent was clinoptilolite, 80 %, with molecular formula  $(\text{Na}_{0.52}\text{K}_{2.44}\text{Ca}_{1.48})(\text{Al}_{6.59}\text{Si}_{29.41}\text{O}_{72})(\text{H}_2\text{O})_{28}$ , 64, as obtained by the use of XRD. The adsorbent BET specific surface area was 45.7 m<sup>2</sup>/g and particle size distribution in the range 0.4-0.8 mm. Prior to the experimental procedure, material was washed by deionized water, dried for 2 h at 105°C and placed in desiccator. The homogenization of dry sorbent was reached using mortar and pestle. Minimal processing for material preparation was accomplished in order to simplify its production. Zeolite was tested as natural sorbent for zinc(II) ions removal from water solution. Influence of zeolite mass, temperature and contact time on adsorption capacities, kinetics and thermodynamics was investigated. Zinc(II) ion removal capacity of 65.5 mg g<sup>-1</sup> at 318.15 K, obtained using of Langmuir 2 model, indicated that natural zeolite had high efficiency in processes of Zinc removal. Kinetic study fitting by Weber-Morris model predicted intra-particle diffusion as a rate-controlling step.

P10

## Effect of Alkaline Activator Properties on Structure of Metakaolin-Based Geopolymer Samples

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Considering geopolymers as inorganic polymers, they are actually amorphous network of interlinked silicate and aluminate groups, so they could be prospective ceramic precursors for materials with defined dimensions obtained by casting and firing, but not from powder processing. In this research, the starting material is metakaolin, which was obtained by calcining domes-

tic kaolinite clay. Initially, four series of alkaline activators of NaOH and sodium silicate have been used. Activators present the mixtures of Na<sub>2</sub>SiO<sub>3</sub> and solutions of NaOH, of different molarities 2M, 4M, 6M and 8M. The prepared geopolymer slurries were cast into the designated near shape at room temperature and after that at 60°C. In fact, the post-synthesis curing process (28 days) has an important role in the obtaining good characteristics of geopolymers. Densities, viscosities and refractive index of alkaline activators were determined over the temperature range 15-60°C of process of geopolymerizations. Based on the obtained results of investigated parameters have been selected to predict the properties of materials. All geopolymer samples were characterized by XRD, FTIR, SEM/EDS analysis and Raman spectroscopy providing complementary and valuable information of the investigated materials. This route of ceramics production has advantages associated with producing an environmental friendly, energy saving, clean new technology of geopolymer materials.

## P11

### Adsorption capacities of Shungite - a Russian Mineral

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Shungite, a carbon-rich rock of the Precambrian age widespread over Russia, attracts much attention due to possibilities of application in various industrial and medical fields. Carbon acts as an efficient catalyst of hydrogenation at low temperatures, as an adsorbent and filter in water purification processes, and as a multifunctional filler of polymeric and inorganic binders.

The presence of the starting components  $\alpha$ -SiO<sub>2</sub>, Fe<sub>2</sub>O<sub>3</sub>, carbon C,  $\alpha$ -Al<sub>2</sub>O<sub>3</sub>,  $\gamma$ -Al<sub>2</sub>O<sub>3</sub>, and CaCO<sub>3</sub> has been determined by XRD measurement. Particle size distribution of the initial powder indicates large agglomerates with size of 10 microns and larger, confirmed by SEM also. In a batch test, the influence of shungite mass, contact time and temperature on adsorption efficiency of amlodipine, medicament used to treat high blood pressure and coronary artery disease, has been investigated. This material showed moderate adsorption capacity of 54.95 mg/g at 10 mg/l initial amlodipine concentration. The concentrations of amlodipine were determined using UV-VIS spectrometry.