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

Serbian Ceramic Society
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials
School of Electrical Engineering and Computer Science of Applied Studies

PROGRAM AND THE BOOK OF ABSTRACTS

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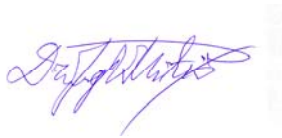
Dear Colleagues, Dear Friends,

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

Advanced Ceramics play an important role in the European Union's prioritized materials to enable the transition towards to a knowledge-based efficient societies. The chosen Conference topics cover fundamental theoretical research in advanced ceramics, modeling and simulation of technological processes, controlled synthesis of nanomaterials, developing of new composite and hybrid structures which should provide practical realization of the new ideas and brings new quality in everyday life. ACA IV Conference gathers the researchers, engineers, academy staff, artist, specialist and PhD students trying to emphasizes the key innovation activities toward developing the next generation of advanced ceramics products for industry of high-technology, renewable energy sources, 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.



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General Conference Topics

- Basic Ceramics Science
- Nanostructural, Bio- and Opto-Ceramic Materials and Technologies
- Multifunctional Materials
- Magnetic and Amorphous Materials
- Construction Materials and Eco-ceramics
- Composite Materials, Catalysis and Electrocatalysis
- Artistic Ceramics and Design, Archaeology and Heritage
- Young Researchers
- Sintering processes
  -kinetics
  -microstructure
  -thermodinamics
  -modeling

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Raman spectroscopy studies (100 cm^{-1} to 500 cm^{-1}) have been performed. Excitation source was 514.5 nm (E_L= 2.41 eV). Dominant spectral structures are registered in spectral region 130 cm^{1}-180 cm^{-1}, around 265 cm^{-1} and around 345 cm^{-1}. First two are assigned as combination modes and mode at 345 cm^{-1} as confined ZnS LO type phonon. Absence of TO mode with visible excitation is consequence of poor scattering efficiency and anti-resonant behavior. We report relatively strong, compared to confined ZnS LO type phonon, Raman activities of combination modes away from the resonance in the strong confinement regime in ZnS nanoparticles.

P6

Modified montmorillonite as nicotine adsorbent

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The adsorptions of nicotine at 298 K from aqueous solution onto natural Wyoming montmorillonite (Wy-M), acid-activated montmorillonite (Wy-M_A) and alkali-activated montmorillonite (Wy-M_{AL}) were investigated. The Wy-M_A and Wy-M_{AL} samples were obtained by acid and alkaline modification process using HCl and Na_2CO_3, respectively. The changes in the chemical and phase composition, as well as the textural properties of the starting and modified samples were monitored using X-ray diffraction, infrared spectroscopy and physisorption of nitrogen. The adsorption experiments were performed in a batch system. The adsorption was monitored with respect to contact time, nicotine initial concentrations (0.1-1mM), mass of adsorbent (12.5 - 200 mg) and pH (2-11). The concentration of nicotine was analyzed before and after the adsorption tests using a UV-Vis spectrophotometer at λ_{max}=261 nm. It was estimated that the equilibrium time for Wy-M and Wy-M_{AL} was 60 min, and 20 min for Wy-M_A. The adsorption study showed that the alkaline modification of montmorillonite slightly affected the adsorption of nicotine (q_e = 0.27 and q_e = 0.24 mmol/g, for Wy-M and Wy-$M_{AL,}$ respectively). On the other hand, acid modification significantly improved adsorption capacity of montmorillonite (q_e= 0.52 mmol/g). The adsorption results were fitted by Langmuir, Freundlich and Sips adsorption isotherms.

P7

Organomodified bentonite clay: Characterization and sorptive properties towards phenol and its derivatives

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Bentonite clay from Mečji Do locality in Serbia was organomodified. The organomodification was performed with hexadecyltrimethylammonium (HDTMA) bromide,

and the sample was denoted as HDTMA-MD. The characterization of the clay-based material consisting of X-Ray diffraction, elemental analysis and point of zero charge determination, was performed.

The sorption of phenol and its three nitro derivatives: 2-nitrophenol (2NP), 3-nitrophenol (3NP) and 4-nitrophenol (4NP) on HDTMA-MD was investigated. The experiments were performed in aqueous solution, during three hours, at constant temperature (25 °C) and with initial sorbate concentrations of 2×10^{-4} mol dm^{-3}. The sorption capacity of HDTMA-MD toward phenol derivatives increased in the following order q_e (phenol) < q_e (3NP) < q_e (2NP) < q_e (4NP). The sorption capacity of different phenol derivatives could be affected by their solubility in water, hydrogen bonds that they could form with sorbent, acidity and chemical structure of the sorbate, including the presence of the nitro group and its position in phenol ring.

The influence of sorption time and initial concentration on the sorption efficiency of HDTMA-MD was studied for 4NP since it showed the best sorption on the investigated material. The isotherm data were best fitted with Langmuir model, while the sorption dynamics obeyed the pseudo-second-order kinetic model for all initial concentrations.

P8

Structure characterization of Ni incorporated SOFC anode ceramic matrixes

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Proton conducting solid oxide fuel cells (pSOFCs) operates at intermediate temperatures (about 600°C). They use hydrogen as fuel and a solid oxide (ceramic) electrolyte to conduct protons created at the anode to the cathode. The electrochemical reaction which brings to the production of water as waste product occurs at the cathode side. Perovskite structured materials like as $BaCe_{0.85}Y_{0.15}O_{3-\delta}$ (BCY15) are known as good proton conductors. Ni cermets are usually used as anodes for SOFCs because Ni metal at the given operating temperatures performs similarly to noble metal-based catalysts, but offers significant cost savings. Generally, Ni cermet is produced by oxides powder mixtures sintering. However, this approach is costly and requires extreme experimental conditions.

The aim of this work is to study the possibilities for application of wet-chemical incorporation procedures for the synthesis of BCY15/Ni anode cermet. Ni was doped by impregnation and precipitation with different alkaline agents such as urea, NaOH and $NaCO_3$. Direct impregnation with metal Ni was also applied. The prepared Ni-BCY15 samples were characterized using X-ray diffraction and FTIR techniques.

It was found that the most promising method is urea homogeneous precipitation which provides for obtaining fine-dispersed $Ni(OH)_2$ structure – a good precondition for fine-grained metal nickel particles creation. The direct impregnation of Ni nanoparticles seems to be also a good approach. Further efforts will be concentrated on those two methods.