Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION XI
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 2023.

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Dear colleagues and friends,

We have great pleasure to welcome you to the Advanced Ceramic and Application XI 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.

It is nice to host you here in Belgrade in person. 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..

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

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Institut za tehnologiju nuklearnih i drugih mineralnih sirovina

(75keV, 2×10^{14} and 4×10^{14} ions/cm^2) on physicochemical properties of hydrothermally synthesized $BiVO_4$ thin films were examined. From X-ray diffraction (XRD) study can be concluded that initial monoclinic material didn't sustain any phase transition after irradiation. Also, preferential orientation remained dominantly along [010] direction with a slightly increasing share of [121] oriented growth, especially after irradiation with 2×10^{14} ions/cm^2. XRD measurements showed shift towards the higher 2θ after irradiation which indicates that interplanar distances decreases. The highest level of crystallinity was observed for the sample irradiated with fluence of 4×10^{14} ions/cm^2. Scanning electron microscopy (SEM) revealed prismatic morphology of all samples with an average grain size of 600 nm without visible traces of irradiation.Raman spectroscopy confirmed presence of bands that correspond to the monoclinic scheelite phase. X-ray photoelectron spectroscopy (XPS) analysis of V 2p confirmed presence of V^{5+} and V^{4+} while analysis of O 1s confirmed presence of oxygen in the form of lattice oxygen and in the form of hydroxide. UV-Vis Diffuse Reflectance spectroscopy revealed that calculated band gap decreases with the increase of fluence.

Poster Session II (P14-P45) Club SASA 20th September, 09.00-10.00

P14

Approaches to improve photo(electro)catalytic properties of ZnO-based materials

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Due to their tunable multifunctional properties zinc oxide (ZnO) based materials have attracted extensive scientific and technological attention. Since they combine different properties such as electrochemical activities, chemical and photochemical stability, non-toxicity, biocompatibility, etc. ZnO-based materials have been used in electronics, opto-electronics, biosensing, bioimaging, drug and gene delivery, implants, antimicrobial and anticancer agents. Successful application of ZnO as photoelectrocatalysts arises from its wide band gap (3.37 eV) which can be easily adjusted by different approaches such as: metal and non-metal ion doping, hydrogenation, introducing of crystalline defects, modifying particle morphology and surface chemistry. During the years, to synthesize zinc oxide (ZnO) nanoparticles with improved visible light absorption we have used a fast and environmentally-friendly microwave processing of a precipitate which enable formation of crystalline defects. To further enhance photo(electro)catalytic properties we have employed approaches such as: (1) the incorporation of iron ions into the crystal structure ($Zn_{1-x}Fe_xO$), (2) sensitization of the particles' surface with cetyltrimethylammonium bromide, Pluronic F127 and polyethylene oxide, and (3) composites with ruthenium oxide (ZnO/RuO_2) and graphene oxide (ZnO/GO and ZnO/rGO). To correlate structural and functional properties, prepared materials were characterized using XRD, FTIR, Raman, UV-Vis DRS, and PL spectroscopy, also FESEM; photocatalytic activity of the samples were tested toward

decolorization of methylene blue, while their photoelectrochemical activity for water splitting were tested through linear sweep voltammetry in different electrolytes.

P15

Examination and characterization of nanostructured $Co_{0.9}Ho_{0.1}MoO_4$

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The nanostructured powderwas synthesized by the glycine nitrate procedure (GNP) because it proved to be the most effective and simplest method suitable for controlling the composition and morphology of $Co_{0.9}Ho_{0.1}MoO_4$. To prepare nanostructured $Co_{0.9}Ho_{0.1}MoO_4$, metal nitrates, and glycine were mixed in appropriate stoichiometric ratios. For the preparation of the technologically important $Co_{0.9}Ho_{0.1}MoO_4$, the combustion process has proven to be a promising method that achieves control of stoichiometry, homogeneity, and purity. The synthesized samples were examined by DTA, X-ray diffraction (XRD), Fourier transform infrared (FT-IR) spectra, Spectroscopy, Field emission scanning electron microscopy (FESEM), and nitrogen adsorption method. The acquired nanopowder showed a tendency for agglomeration, inhomogeneous microstructure, and plate-like crystals. The photocatalytic activity of the obtained $Co_{0.9}Ho_{0.1}MoO_4$nanopowders was evaluated by the photocatalytic degradation of crystal violet in an aqueous solution. After photocatalytic testing and all the above-mentioned characterizations, it was shown that these nanostructured materials represent promising solutions in photocatalytic processes toward green chemistry and sustainable development.

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