Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION X
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, 26-27. September 2022.

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investigated: simple mixing, thermal treatment induction and *in situ* synthesis/grafting reactions. Two amino acid precursors were separately tested in grafting procedures: pure alanine and alanine methyl ester hydrochloride. The efficiency of grafting was determined based on X-ray powder diffraction (XRPD), Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM) and thermal analyses (DSC, TG/DTA) of obtained powders, while complementary UV-VIS spectroscopy of supernatants was additionally performed for quantitative determination of non-grafted nitrogen using ninhydrin standardized procedure.

ORL8

Quantum efficiency of up-converting $SrGd_2O_4$:Yb,Er nanoparticles

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Up-conversion properties of $SrGd_2O_4$ nanoparticles co-doped with different Yb^{3+} and constant Er^{3+} ions were successfully prepared *via* sol- gel assisted combustion. Rietveld refinement and scanning/transmission electron microscopy with corresponding energy-dispersive X-ray spectroscopy revealed that obtained powders are composed of agglomerated nanoparticles with orthorhombic (*Pnma*) structure that have a uniform distribution of all constituting elements. Photoluminescence measurements implied intensification of the up-conversion (UC) emission in the visible part of spectrum with the increase of Yb^{3+} content, which is followed by a significant change in the green to red ratio. Two-photon UC processes are established as a result of Er^{3+} f-f electronic transitions: green emission at 523 and 551 nm ($^2H_{11/2}$, $^4S_{3/2} \rightarrow {}^4I_{15/2}$) as well as a red emission at 661 nm ($^4F_{9/2} \rightarrow {}^4I_{15/2}$). The highest value of absolute quantum efficiency (0.055%) is determined for $SrGd_2O_4$ nanoparticles doped with 0.5 at% of Er^{3+} and co-doped with 5 at% of Yb^{3+} (λ_{exc}=976 nm, power density 200W/cm^2).

ORL9

Electronic structure of silver-bismuth iodide rudorffite nanomaterials studied by synchrotron radiation soft X-ray photoemission spectroscopy

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Silver-bismuth iodide (Ag-Bi-I) rudorffites are chemically stable and non-toxic materials that can act as a possible replacement for methylammonium lead halide perovskites in optoelectronic devices. In this report we will present innovative routes for fabrication of Ag-Bi-I nanomaterials, as well as the results of the investigation of the electronic structure of isolated Ag-Bi-I nanoparticles by soft X-ray aerosol photoemission spectroscopy [1, 2]. Aerosol photoemission spectroscopy allows studies of the electronic structure of submicrometer particles that are free from the influence of a substrate or solvent [1-5]. In this approach the aerosol particles can be produced directly from a solution or a colloidal dispersion, which opens a possibility for investigation of a variety of nanosystems that can be produced by wet chemistry methods. This technique relies on the interaction of focused beam of isolated particles with ionizing radiation under high vacuum conditions. In addition, by using tunable synchrotron radiation as an excitation source it is possible to obtain high-resolution photoelectron spectra in the investigated photoelectron energy range.

ORL10

Thermostable polyurethane composites consisting of bio-based polimer matrix and inorganic mineral reinforcements

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The main goal of this study obtaining a composite material with matrix from a natural resource, reinforced with mineral fillers and fibers to achieve excellent thermal behavior. The polymer matrix was castor oil, strenghtened with carbon and Kevlar fibers, oxamide, aluminium trihydrate (ATH), carbon black and their combinations. The first step was design of the composites, which provides easy processing, optimal curing time and good thermal properties. Regard to this, the maximum amount of reinforcements as well as their combination was taken into account. Cured composites were characterized by uniaxial tensile test and dynamic mechanical thermal analysis (DMTA), while trermal properties were examined using modified oxy-acetylene test. The results of mechanical tests showed that the obtained materials have good tensile strength with sufficient flexibility for stress redistribution, which is necessary when exposed to flame or extreme heat. The addition of reinforcements affected the glass transition temperature, but not significantly in respect to neat castor oil matrix. Modified oxy-acetylene test showed that open flame did not penetrate through the prepared materials due to formation of protective carbonaceous layer with good mechanical integrity. These preliminary results verify the use of such materials in applications where thermal and mechanical durability is required.