



**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 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, 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

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**P7**

**Facile synthesis of hydrophilic polymer-capped upconverting NaYF<sub>4</sub>:  
Yb,Er particles**

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Over the last decade, solvothermal decomposition of organometallic compounds has been indicated as one of the most convenient method for the synthesis of monodisperse lanthanide doped upconverting fluorides. Due to their hydrophobic nature such particles could not be used for a conjugation of the molecular targeting agents which is necessary for optical imaging of biological tissues. In this work, hydrophilic NaYF<sub>4</sub>:Yb,Er (17 mol% Yb; 3 mol% Er) nanoparticles were synthesized by facile one-pot hydrothermal synthesis performed with a help of chitosan (CS) and poly(acrylic acid) (PAA). Obtained powders were analyzed by X-ray powder diffraction (XRPD), field emission scanning electron microscopy (FE-SEM), Fourier transform infrared (FTIR) and photoluminescence (PL) spectroscopy. The obtained results implied that particle size, shape and surface characteristics are dependent on the polymer choice. Although both powders crystallize in the same crystal arrangement (cubic, *Fm-3m*) more intense red emission, assigned to the Er<sup>3+</sup> <sup>4</sup>F<sub>9/2</sub> → <sup>4</sup>I<sub>15/2</sub> electronic transitions, characterize spherical NaYF<sub>4</sub>:Yb,Er@CS particles. To assess a biological safety of their use, viability of the human gingival fibroblasts (HFG) was additionally tested by a colorimetric MTT assay.

**P8**

**Al,Fe,Ni-pillared bentonite in catalytic wet peroxide oxidation of textile dye  
Acid Yellow 99**

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In this work catalytic performance of Al,Fe and Al,Fe,Ni-pillared bentonite was studied in the heterogeneous catalytic wet peroxide oxidation (CWPO) of textile dye Acid Yellow 99 used as a model compound. Pillared bentonites were synthesized using the bentonite from Mečji Do, Serbia and the pillaring solutions contained the different molar ratios of Al<sup>3+</sup>, Fe<sup>3+</sup> and Ni<sup>2+</sup> cations: a) 90 % Al, 10% Fe (AlFe10-PILC), b) 85% Al, 10% Fe,

5% Ni (AlFe10Ni5-PILC), and c) 90 % Al, 5% Fe, 5% Ni (AlFe5Ni5-PILC). The XRD, chemical and FTIR analysis and nitrogen physisorption at -196°C were used for the characterization of the obtained samples. All results of the characterization confirmed successful pillaring. Degree of decolorization of dye containing aqueous solution was monitored using UV-Vis spectroscopy. The experiments were performed using solution with initial concentration of 50 mg dm<sup>-3</sup> at 60 °C with respect to the catalyst and H<sub>2</sub>O<sub>2</sub> amount. The catalytic degradation for all investigated catalysts followed the first order kinetics. Among the investigated materials AlFe10Ni5-PILC was found to be the most promising one for CWPO of AY99. These investigation are proof of concept that Al,Fe,Ni-pillared bentonite are applicable in CWPO.

## P9

### **Radioadaptive irradiation combined with radiosensitising effects of gold nanoparticles on the healthy and cancer human lung cell lines**

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Many substances and materials have been reported to be radiosensitizers, some of which are gold nanoparticles GNP, too. Studies have shown that the presence of GNP increases the production of electrons and free radicals. Generally, radiosensitising with GNP depends on the nanoparticles' size, shape, ζ potential, and coating. The aim of this study was to investigate the optimal combination of radioadaptive irradiation with GNP on the healthy human lung fibroblast cell lines (MRC5) and human lung adenocarcinoma cells (A542). Also we examined potential synergistic effects between coating of GNP with β-cyclodextrine (βCD) and designed modality of irradiation. Gold nanoparticles and gold nanoparticles-βCD were measured in order to determine their size distribution and ζ-potential. The influence of different irradiation regimes on the survival of cells (viability) was determined using MTT assay.

## P10

### **Hybrid macroporous polymer/clay nanocomposites**

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Hybrid polymer/nanocomposites are a new class of materials that consist of polymer matrix and clay nanoparticles as the dispersed phase. The aim of this work was to obtain macroporous poly(glycidyl methacrylate-co-ethylene glycol dimethacrylate)/clay nanocomposites *p*(GEM-NC) with different porosity and morphology.