Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION VIII
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, 23-25. September 2019.

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Dear Colleagues,

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

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 emphasizes the key achievements which will enable the wide speared 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 supported by the Serbian Chapter of American Ceramic Society and European Academy of Sciences and Arts.

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
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Conference Topics

- Basic Ceramic Science & Sintering
- Nano-, Opto- & Bio-ceramics
- Modeling & Simulation
- Glass & Electro Ceramics
- Electrochemistry & Catalysis
- Magnetic & Refractory Ceramic
- Renewable Energy, Composites & Amorphous Ceramics
- Heritage, Art & Design

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INV-NOB 3

Models and methods for testing the cells and tissues interactions with biomaterials

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A material is considered biocompatible if it enables the body to function without complications or adverse side effects and to generate the most appropriate and useful cells' and tissues' response, optimizing the clinically relevant effect. Biocompatible material needs to be evaluated through its interaction with the biological environment. Biocompatibility testing of the interactions between biomaterials, cells and tissues includes *in vitro*, *in vivo* (animal experiments) and clinical evaluation. *In vitro* models are relatively simple, reproducible, relatively cheap, and fast, require small amount of the material and minimize the use of animals for testing purposes. The disadvantages of these models are uncertainness of the clinical relevance and that chronic effects cannot be tested. After *in vitro*, more comprehensive studies are being done on experimental animal models. Real simulation of the state of the body is possible and biocompatibility and safety can be determined in a more realistic biological environment. Disadvantages are a higher price, long duration and ethical issues. The choice of models and testing methods depends on the location, nature and duration of the body contact with the material intended for medical use. The evaluation of the implanted material and surrounding tissue can be done using a number of methods such as histological, physicochemical, biochemical, immunological, hematological, genetic, radiographic, ultrastructural, etc. Clinical trials are the final step in the evaluation process of interactions biomaterials-cells/tissues.

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INV-MC 1

How do preparation method and starch-encapsulation influence the magnetic properties of nanocrystalline cobalt ferrite?

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To investigate the influence of the preparation method on the magnetic properties, cobalt ferrite nanoparticles were carefully designed by five different routes. To control the particle size and enhance dispersibility inan aqueous medium, starch, a natural and biocompatible compound, was used for coating suchmagnetic powders. The presence of a single-phase spinel structure was confirmed in all cases by X-ray powder diffraction (XRPD). Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) analyses indicatedthat the nanostructured particles were uniform in size and shape. According to the Fourier transform IRspectra of the coated samples, additional bands originating from starch appeared, indicating successful functionalization.The magnetic measurements separated samples into two groups. The slight increase of saturation magnetization value for starch-coated samples prepared by co-precipitation, ultrasonically assisted co-precipitation and microwave assisted hydrothermal methods can be explained by the incomplete starch coverage. Moreover, coating procedure could initiate agglomerate breakage, followed by re-ordering of magnetic moments.The magnetic properties and agglomeration effect decreased for starch-functionalized nanomaterials in comparison to their as-prepared analogs, synthesized in mechanochemical and microemulsion manner, giving the courage for their further biomedical and technological applications.