



**Serbian Ceramic Society Conference**  
**ADVANCED CERAMICS AND APPLICATION IX**  
**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, 20-21. September 2021.**

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**EUROPEAN ACADEMY**  
of Sciences and Arts

Dear colleagues and friends,

We have great pleasure to welcome you to the Advanced Ceramic and Application IX 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. As you probably know, Serbia launched a vaccination campaign at the beginning of this year, so up to date more than 50 percent of the adult population has been vaccinated. Since there is no one statistic to compare the COVID19 outbreaks and fears for loved ones in different countries, we believe that we all suffer similarly during this pandemic. That is why we appreciate even more your positive attitude and readiness to travel in this uncertain time. We understand that some of you had to cancel your lectures in the last minute due to the travel limitation in your countries, but we hope that you will come next year. We deeply hope that the ACA IX Conference will be worth remembering, that you will respect all COVID-19 safety measures at SASA building, that you will have a nice time here and that ultimately you will return to your home safely. 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 nanoceramic 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 16 sessions. Part of our members are also members of the Serbian Chapter of ACerS since 2019. Their activities in the organization of this conference is highly recognized. To them and all of you thanks for being with us here at ACA IX.

**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 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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## INV

### **Fractals, Graphs and Neural Networks: The Holly Trinity of Nanostructures - An Overview and Comparison of Methods**

Vojislav V. Mitić<sup>1,2</sup>, Branislav Randelović<sup>1,3</sup>, Srdjan Ribar<sup>4</sup>, Dušan Milošević<sup>1</sup>, Marina Soković<sup>5</sup>, Bojana Marković<sup>1</sup>, Hans Fecht<sup>6</sup>, Branislav Vlahović<sup>7</sup>

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There are a lot of recently published research papers regarding representing nanostructures and biomimetic materials, using simple but powerful mathematical methods. In most of them, fractal theory, graph theory and neural networks are used. Having in mind variety of those methods, but in the same time complementarity and compatibility, they became very useful tool, and we named it “Holly Trinity” of mathematical approach in nanostructures. In this research we give an overview on interesting results in modelling nanostructures and their electrochemical and magnetic parameters, using those very actual and “easy to use” methods: fractal theory, graph theory and neural networks. We also compare them, in order to conclude about areas of their most useful applications.

## INV

### **Discrete mean square approximation applied on molecules and bacteria Brownian motion error calculation**

Branislav Randelović<sup>1,2</sup>, Vojislav V. Mitić<sup>1</sup>, Dušan Milošević<sup>1</sup>, Bojana Marković<sup>1</sup>, Vesna Paunović<sup>1</sup>, Sanja Aleksić<sup>1</sup>, Branislav Vlahović<sup>3</sup>

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Brownian motion, with its fractal nature, exists as a general phenomenon in both living and nonliving matter systems. Integration of these two systems structures is very important for nowadays complex and advanced ceramic materials designing and technology development. Therefore, the goal of our research is to analyze Brownian motion, as a