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 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, 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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The crystallite size was estimated from the obtained XRD data with the help of X'pert High Score software. The average crystallite size, as estimated from the x-ray diffraction data, was found to be in nanosize for all samples sintered in the above mentioned temperature range. The crystallite size and particle size (as observed from FESEM) for10GDC sintered from 800 to1200^{o}C was found to be in the range of 54.73-85.23 nm respectively The lattice parameter and lattice cell volume were measured using Cell Refine software.

It is observed that the sintering temperature has significant effect on the surface morphology and crystallite size. The surface morphology of all the microwave sintered samples were recorded using Field Emission Scanning Electron Microscopy (FE-SEM). Denser nanostructures were observed in case of 10GDC samples sintered at 800^{o}C, when compared those sintered at higher tempertaures. Further, the density of the pellets goes on decreasing with the increase in sintering temperature, which is in good agreement with the reported data. The density varied in the range between 7.49 to 6.89 g/cm^3.

OR-EM2
Fractal nature Heywang model correction and Brownian motions

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Ceramics grains contacts are essential for understanding complex dielectric properties of electronic ceramics materials. Since the actual contact surface is an irregular object, the theory of fractal sets is applied. Also, the Heywang model of intergranular capacity are introduced as a basic idea for relations with fractal structure. The $BaTiO_3$-ceramics has fractal form in, at least, two levels: shapes and distributions of grains and intergranular contacts. Using fractal modeling approach, reconstruction of microstructure, like shapes of grains or intergranular contacts can be successfully done. Furthermore, the area of grains surface is calculated by using fractal correction that expresses the irregularity of grains surface through fractal dimension. It is known that $BaTiO_3$ and similar ceramics have fractal nature based on three different phenomena. First, there is process of Brownian-fractal motions inside the material during sintering in the form of flowing micro-particles –ions, atoms, electrons which is an essentially fractal phenomena. This motion has fractal structure and can be undergo the process of fractal modification. Second, there are so called "negative space" made of pores and intergranular space. Being extremely complex, the pore space plays an important role in microelectronic, PTC and other phenomena. Third, ceramic grains have fractal shape seeing as a contour in cross section or as grain's surface. These triple factors, in combination, make the microelectronic environment of very peculiar electro-static and dynamics microelectronic environment.

In order to obtain an equivalent circuit model, which provides a more realistic representation of the electronic materials electrical properties, in this article an intergranular contacts model for the $BaTiO_3$ electrical properties characterization were determined and implemented. Considering obtained results, the directions of possible $BaTiO_3$-ceramics materials properties prognosis are determined according to the correlations synthesis-structure-properties.