Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION

Organized by
Serbian Ceramic Society
&
Institute of Technical Sciences of SASA

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
May 10-11th, 2012, Belgrade, Serbia

Book title: Serbian Ceramic Society Conference - ADVANCED CERAMICS AND APPLICATION: Program and the Book of Abstracts

Publisher:
Serbian Ceramic Society

Editors:
Prof. Dr. Vojislav Mitić
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Technical Editor:
Aleksandra Stojičić

Printing:
Serbian Academy of Sciences and Arts,
Knez Mihailova 35, Belgrade, Serbia
Format
Pop Lukina 15, Belgrade, Serbia

Edition:
70 copies

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

666.3/.7(048)
66.017/.018(048)

SERBIAN Ceramic Society. Conference (1 ; 2012 ; Beograd)
Advanced Ceramics and Application : program and the book of abstracts / #[1st] #Serbian Ceramic Society Conference, May 10-11th, 2012, Belgrade, Serbia ; organized by Serbian Ceramic Society & Institute of Technical Science of SASA ; [editors Vojislav Mitić, Nina Obradović, Lidija Mančić]. - Belgrade : Serbian Ceramic Society, 2012 (Belgrade : Serbian Academy of Sciences and Arts). - XII, 37 str. ; 29 cm

Tiraž 70.

ISBN 978-86-915627-0-0
1. Srpsko keramičko društvo (Beograd)
a) Керамика - Апстракти b) Наука о материјалима - Апстракти c) Наноматеријали - Апстракти
COBISS.SR-ID 190546188

S1.2

New Frontiers: Miniaturization and Higher Level $BaTiO_3$ -Ceramics Microelectronics Circuits Integration

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Since that the scientific and technological efforts to further miniaturization, "better packaging" and higher levels of integration of electronic components and subsystems, and modern microelectronics devices are increasingly limited, the new field of scientific views and perspectives in previously presented scientific work, contribute and create new solutions of electronics and materials science higher unity with the goal to be recognized the desired functions and highly integrated electronic properties with in the different microstructures levels.

In this study, in order to establish grain shapes of sintered ceramics, new approach on correlation between microstructure and properties of rare-earth doped $BaTiO_3$ -ceramics based on fractal geometry, related to intergranular contact surfaces and mathematical statistics calculations has been developed.

$BaTiO_3$-ceramics doped with different additives (Mn, La, Er, Yb, Ho,) were prepared using conventional solid state procedure and sintered at 1320°C.

The microstructure of specimens was investigated by SEM-5300 and capacitance has been done using LCR-meter Agilent 4284A. By using fractal modeling method of microstructure configurations reconstruction, like shapes of grains or intergranular contacts has been successfully done. Furthermore, the area of grains surface was calculated using fractal correction that expresses the irregularity of grains surface through fractal dimension

For better and deeper characterization of the ceramics material microstructure the Voronoi model, mathematical statistics calculations, microstructure analysis on vertical view od the fracture between two pieces of samples, and contact surfaces analysis between the particles and grains, are applied

The presented results indicate that fractal method for analysis of the structure of ceramics provides a new approach for describing, predicting and modeling the grain shape and relations between the $BaTiO_3$ -ceramic structure and dielectrical properties.