

**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:

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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

S1.5

Study of Dielectric Behavior and Electrical Properties of Hematite α -Fe₂O₃ Doped with Zn

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The effects of Zn-doping on the dielectric behavior and electrical properties of bulk α -Fe₂O₃ have been studied. X-ray diffraction analysis revealed the presence of two phases in all samples: hematite and spinel ZnFe₂O₄, with the amount of spinel phase increasing with increasing Zn content. Scanning electron microscopy analysis combined with energy dispersive X-ray spectroscopy showed that the Zn-bearing phase occurred in the form of individual spinel ZnFe₂O₄ grains in a hematite matrix. DC conductivity was measured in the temperature range 25-225°C (298-498 K). Impedance spectroscopy measurements in the same temperature range were carried out in the frequency range 100Hz to 10 MHz. Increase in the Zn content resulted in increased electrical conductivity and higher values of the dielectric constant. The resistance and capacitance of grains and grain boundaries were analyzed by modeling the experimental results using an equivalent circuit.

Keywords: X-ray diffraction; scanning electron microscopy, SEM; dielectric response; electrical transport.

S1.6

Influence of Mechanical Activation on Structural and Properties of Sintering MgTiO₃

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Magnesium titanate based dielectric materials are used for producing type-I capacitors. A common way of obtaining this material is a solid-state reaction during reaction sintering. The process of sintering can be enhanced if mechanical activation precedes. In this work starting powders of magnesium carbonate (MgCO₃) and titanium dioxide (TiO₂) with a rutile crystal modification. Mechanical activation of the starting mixture was performed by high energy ball milling using ZrO balls and vessels with a ball to powder mass ratio of 40:1. The observed grinding times were 15, 30, 60 and 120 minutes. Powder characterization was conducted using DTA analysis up to 1000°C and particle morphology changes were observed with Scanning Electron Microscopy. Isothermal sintering of compacted powders was conducted at 1100°C during 30, 60 and 180 minutes. For specimens synthesized in such a manner, microwave dielectric properties were measured, quality factor Q , specific electrical resistivity (ρ) and the dielectric constant (ϵ_r).