Serbian Ceramic Society Conference ADVANCED CERAMICS AND APPLICATION II New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials
Institute for Testing of Materials
Archeological Institute of SASA

PROGRAM AND THE BOOK OF ABSTRACTS

Book title: Serbian Ceramic Society Conference - ADVANCED CERAMICS AND

APPLICATION II: Program and the Book of Abstracts

Publisher:

Serbian Ceramic Society

Editors:

Prof.dr Voja Mitić Dr Nina Obradovic Dr Lidija Mančić

Technical Editor:

Dr Lidija Mačić

Printing:

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

Edition:

100 copies

Mosaics: Original Format 30x40 cm

Mirjana Milić, Vladimir Skerlić, Maja Opačić, Maša Nicić, Nina Nicić, Milica Konstantinović, Marjan Vesić - Academy od SOC for Fine Arts and Conservation

CIP - Каталогизација у публикацији Народна библиотека Србије, Београд

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

SERBIAN Ceramic Society. Conference (2; 2013; Beograd)

Advanced Ceramics and Application: new frontiers in multifunctional material science and processing: program and the book of abstracts / II Serbian Ceramic Society Conference, Sep 30th-Oct 1st, 2013, Belgrade, Serbia; organized by Serbian Ceramic Society... [et al.]; [editors Vojislav Mitić, Nina Obradović, Lidija Mančić]. - Belgrade: Serbian Ceramic Society, 2013 (Belgrade: Serbian Academy of Sciences and Arts). - XVI, 61 str.; 30 cm

Tiraž 100.

ISBN 978-86-915627-1-7

- 1. Serbian Ceramic Society (Beograd)
- а) Керамика Апстракти b) Наука о материјалима Апстракти
- с) Наноматеријали Апстракти

COBISS.SR-ID 201203212

P14

Influence of MoO₃ on sintering temperature of mechanically activated MgO-Al₂O₃-SiO₂ system

N. Đorđević¹, N. Obradović², A. Radosavljević-Mihajlović³, B. Jokić⁴, S. Filipović², M. Mitrić³, S. Marković²

¹Institute for Technology of Nuclear and Other Mineral Raw Materials, Belgrade, Serbia ²Institute of Technical Sciences of SASA, Knez Mihailova 35/IV, Belgrade, Serbia ³Vinča Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia ⁴University of Belgrade, Faculty of Technology and Metallurgy, Belgrade

Cordierite, 2MgO·2Al₂O₃·5SiO₂, is a very attractive high-temperature ceramic material, due to its outstanding electrical characteristics, such as the low temperature expansion coefficient, low dielectric constant and good mechanical properties. In order to accelerate the process of sintering, 5.00 mass% MoO₃ has been added to the starting mixtures. The mechanical activation of the starting mixtures was performed in a high energy ball mill during 0-80 minutes. The particle size analysis (PSA) was employed in order to determine the changes in the particle size of the mechanically treated powders. The phase composition of the starting powders and sintered samples was analyzed by the X-ray diffraction method. Furthermore, differential thermal analysis (DTA) was used in order to determine characteristic temperatures within the system during heating. Based on the obtained DTA results, it was established that mechanical activation has some influence on temperatures of phase transitions. Sintering process was performed in air at 1200°C for 2h.

P15

Structural characterization of mechanically activated MgO-TiO₂ system

S. Filipović¹, N. Obradović¹, J. Krstić², M. Šćepanović³, V. Pavlović¹ and M. M. Ristić⁴

¹Institute of Technical Sciences-SASA, Knez Mihajlova 35/IV, 11000 Belgrade, Serbia
 ²University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Department of Catalysis and Chemical Engineering, Njegoševa 12, 11000 Belgrade, Serbia
 ³Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia
 ⁴Serbian Academy of Sciences and Arts, Knez Mihajlova 35, 11000 Belgrade, Serbia

In this article the influence of ball miling process on structure of MgO-TiO₂ system was investigated. The mixtures of MgO-TiO₂ powders were mechanically activated in a planetary ball mill for the time period from 0 to 120 minutes. The influence of mechanical activation on the lattice vibrational spectra was studied by Raman spectroscopy at room temperature. Structural investigations have been performed on produced powders. Nitrogen adsorption method was used to determine the BET specific surface area and pore size distribution. Unusual results have been obtained: specific surface area continuosly decreased up to 40 minutes of activation and increased after that, reaching its minimun value of 5.5 m²/g. The Raman spectra of activated powders have shown that anatase modes have been decreasing in intensity and broadening as the time of

activation extended. Also, the additional modes attributed to TiO₂ II, srilankite and rutile phases started to appear as a consequence of activation.

P16

Annealing and doping concentration effects of Y₂O₃: Sm³⁺nanopowder obtained by self-propagation room temperature reaction

Sanja Ćulibrk, Vesna Lojpur, Vesna Đordjević and Miroslav D.Dramićanin

Vinča Institute of Nuclear Sciences, University of Belgrade, P.O. Box 522, Belgrade, Serbia

In this report, structure, morphology and luminescence of Y_2O_3 :Sm³+nanoparticles prepared by self-propagating room temperature reaction are presented. This new, simple and cost effective synthesis allows obtaining desired phase composition by mixing appropriate amounts of yttrium and samarium nitrates together with sodium hydroxide. A set of samples is prepared with different Sm³+concentrations (0.1, 0.2, 0.5, 1 and 2 at %) in order to observe changes of luminescence properties. Also, effects of post synthesis annealing at several temperatures (600 °C, 800 °C and 1100 °C) are analyzed. For all samples X-ray diffraction showed that powders have cubic bixbyite structure (Ia-3), and TEM analysis showed particles of about 50 nm. Luminescence emission spectra clearly show peaks characteristic for electronic spin-forbidden transition of Sm³+ ions ${}^4G_{5/2} \rightarrow {}^6H_{5/2}$, ${}^6H_{7/2}$ and ${}^6H_{9/2}$ centered at 578, 607 and 654 nm, respectively. Emission lifetime values decrease with Sm³+ ion concentration increments, from 1.94ms for 0.1 at% to 0.97 ms for 2 at%. In addition, enlargement of lifetime values observed when thermal treatment is done at the highest temperature due to the elimination of luminescence quenching species from the surface of particles.

P17

Effect of processing parameters on structural and morphological Y_2O_3 : Yb^{3+}/Ho^{3+} powders characteristics

V. Lojpur¹, L. Mancic², B.A. Marinkovic³, M.D. Dramicanin¹, O. Milosevic²

¹Vinca Institute of Nuclear Science, University of Belgrade, P.O. Box 522, Belgrade, Serbia ²Institute of Technical Sciences of SASA, K. Mihailova 35/IV, Belgrade, Serbia ³ Departamento de Engenharia de Materiais, PUC-Rio, Rio de Janeiro, RJ, Brazil

Up-converting yttrium oxide powders doped with Yb³⁺ and co-doped with Ho³⁺ were synthesized through hydrothermal processing at 200 °C/3 h. Reverse precipitation of the starting nitrates mixture is performed with the help of ammonium hydrogen carbonate (AHC) solution up to pH 7 or pH 9 prior to hydrothermal treatment. Morphological features of the as-prepared (asp) powders and rare earth oxides obtained after powders additional annealing at 1100 °C (3 and 12 h) are discussed based on X-ray powder diffractometry (XRPD), scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS). Structural refinement confirmed generation of the cubic bixbyte-structure (S.G. *Ia*-3) with non-uniform accomodation of dopants at C₂ and S₆ cationic sites. SEM revealed that the particles have plate-like or rod-like morphology in dependence of hydrothermal processing (pH). Due to the fact that are composed from nanograins (30-100 nm) they