The Serbian Ceramic Society
The Academy of Engineering Sciences of Serbia
Institute for Multidisciplinary Research - University of Belgrade
Institute of Physics - University of Belgrade
Vinča Institute of Nuclear Sciences - University of Belgrade

PROGRAMME and the BOOK of ABSTRACTS

2CSCS-2013

2nd Conference of the Serbian Ceramic Society
June 5-7.2013. Belgrade Serbia

Edited by:
Snežana Bošković
Vladimir V. Srdić
Zorica Branković

Programme and Book of Abstracts of The Second Conference of The Serbian Ceramic Society **publishes abstracts from the field of ceramics, which are presented at international Conference.**

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Publisher
Institute for Multidisciplinary Research, University of Belgrade
Kneza Višeslava 1, 11000 Belgrade, Serbia

For Publisher
Prof. Dr Sonja Veljović Jovanović

Printing layout
Vladimir V. Srdić

Press
FUTURA, Novi Sad, Serbia

CIP – Каталогизација у публикацији
Народна библиотека Србије, Београд

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

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

Program ; and the Book of Abstracts / 2nd Conference of the Serbian Ceramic Society, 2CSCS-2013, June 5-7, 2013, Belgrade, Serbia ; [organizers] The Serbian Ceramic Society ... [et al.] ; edited by Snežana Bošković, Vladimir Srdić, Zorica Branković. - Belgrade : Institute Multidisciplinary Research, 2013 (Novi Sad : Futura). - 102 str. ; 24 cm.

Tiraž 120. – Registar.

ISBN 978-86-80109-18-3

1. Bošković, Snežana [уредник] 2. Serbian Ceramic Society (Beograd)
a) Керамика - Апстракти b) Наука о материјалима – Апстракти
c) Наноматеријали - Апстракти

COBISS.SR-ID 198593292

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CHEMICAL STABILITY ENHANCEMENT OF DOPED $BaCe_{0.9}Y_{0.1}O_{3-\delta}$ AS AN ELECTROLYTE FOR PROTON CONDUCTING SOFCs

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$BaCe_{0.9-x}Nb_xY_{0.1}O_{3-\delta}$ and $BaCe_{0.9-x}Ta_xY_{0.1}O_{3-\delta}$ (where x = 0.01, 0.03 and 0.05) powders were synthesized by solid-state reaction method to investigate the influence of dopant and concentration on chemical stability and electrical properties of the sintered samples. The dense electrolyte pellets were formed from the powders after being uniaxially pressed and sintered at 1550ºC for 5h. The electrical conductivities determined by impedance measurements in temperature range of 550-750 ºC in wet hydrogen atmosphere showed a decreasing trend with increase of Nb and Ta content. On the other hand, stability of the sintered samples treated in 100% CO_2 at 700 ºC for 5h determined by X-ray analysis was enhanced with increased concentrations of Nb and Ta. It was found that $BaCe_{0.87}Nb_{0.3}Y_{0.1}O_{3-\delta}$ is the optimal composition that satisfies the opposite demands for electrical conductivity and chemical stability, reaching $8.0 \cdot 10^{-3}$ $Sm \cdot cm^{-1}$ in wet hydrogen at 650 ºC compared to $1.0 \cdot 10^{-2}$ $Sm \cdot cm^{-1}$ for undoped electrolyte. Similar results obtained by doping with Nb and Ta can be explained by almost equal size and same valence of Nb and Ta cations, as well as their similar electronegativities. The electrolyte characteristics are strongly dependent on these properties, whereas doping with Nb showed slightly higher conductivities for each dopant concentration.