The Serbian Society for Ceramic Materials
Institute for Multidisciplinary Research (IMSI), University of Belgrade
Institute of Physics, University of Belgrade
Center of Excellence for the Synthesis, Processing and Characterization of Materials for use in Extreme Conditions "CEXTREME LAB" - Institute of Nuclear Sciences "Vinča", University of Belgrade
Faculty of Mechanical Engineering, University of Belgrade
Center for Green Technologies, Institute for Multidisciplinary Research, University of Belgrade
Faculty of Technology and Metallurgy, University of Belgrade
Faculty of Technology, University of Novi Sad

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Branko Matović
Zorica Branković
Aleksandra Dapčević
Vladimir V. Srdić

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5th Conference of The Serbian Society for Ceramic Materials

June 11-13, 2019
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5CSCS-2019

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НАУКЕ И ТЕХНОЛОШКОГ РАЗВОЈА

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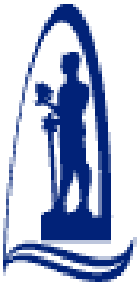

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ADJUSTING THE ELECTROLYTE PROPERTIES OF $BaCe_{0.9}Y_{0.1}O_{3-\delta}$ BY CO-DOPING

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Composition of $BaCe_{0.9}Y_{0.1}O_{3-\delta}$ was changed by co-doping with 5 mole % of different cations (In^{3+}, Zr^{4+} and Nb^{5+}) to examine the influence of dopants on the electrolyte properties. The powder samples were synthesized by the citric-nitric autocombustion method. $BaCe_{0.85}Y_{0.1}In_{0.05}O_{3-\delta}$ was successfully sintered at 1400 °C for 5 h in air, while a complete sintering of the other materials was carried out at 1550 °C. This makes the doping with In a preferable method since sintering temperatures below 1500 °C can limit BaO evaporation. The presence of In and Nb caused a significant drop in the total conductivity (σ) of the ceramics at 700 °C in wet hydrogen, while the total conductivity of $BaCe_{0.85}Y_{0.1}Zr_{0.05}O_{3-\delta}$ was slightly lower than of $BaCe_{0.9}Y_{0.1}O_{3-\delta}$. The stability of the ceramics exposed to a 100 % CO_2 atmosphere at 700 °C for 5 h was investigated by X-ray analysis. $BaCe_{0.85}Y_{0.1}In_{0.05}O_{3-\delta}$ showed considerable stability under the aggressive conditions containing traces of secondary phases, while the other samples were partially or significantly decomposed. By taking into account the factors that can influence the stability and conductivity, it was found that the dopant electronegativity had a decisive role both in inhibiting the carbonation and in decreasing the total conductivity of the ceramics.