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

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

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 17-19. September 2018.

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one powder grade achieved such a high final density (98.4 %TD) at 1500 °C with 10 min holding time. The three others attained significantly lower final densities of 90.3 %TD, 85.4 %TD and 85.0 %TD due to formation of gradient microstructure with nearly dense outer shell (characterized by closed porosity) and porous core of the sample (characterized by open porosity network). Possible causes of this phenomena are discussed.

ORL-BCS 2

Synthesis of wollastonite powder and manufacturing of porous scaffolds for multiple applications

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Wollastonite ($CaSiO_3$) is gaining attention due to its attractive properties, which can be used in a wide field of industries, i.e., thermal insulation; catalysis; filters and water purification; reinforcement phase in composites; and more recently, in orthopaedics. The additive manufacturing method has been used to process various materials in order to obtain diverse shaped-structures with controlled porosity. The aim of the present work is to establish an easy synthesis and processing of wollastonite powder to elaborate porous structures via robocasting technique. An injectable paste that serves as an ink was developed to build up cylindrical structures of 10 mm in diameter and 10 mm in height, using a tip of 410 μm. The cylinders were 3D-printed following two different arrangement patterns, named as honeycomb and rectilinear infills. In the same way, two pore sizes of 350 and 500 μm were produced. The final structures were evaluated in terms of their porosity, shape and size of pores by scanning electron microscopy and compression test. The purity of the wollastonite bodies was evaluated by X-ray diffraction. Moreover, preliminary studies were carried out on the final consolidated porous scaffolds showing its potential use in catalysis, water purification and/or orthopaedics.

ORL-BCS 3

Interaction of oxide ceramics with metal hydrides

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Magnesium hydride (MgH_2) is one of the most favorable hydrogen storage materials because it is directly formed from the reaction of Mg metal with gaseous hydrogen while reaching a high mass capacity (7.6 wt %). However, the sorption reaction is too slow for practical use and needs higher temperature than 300 °C for hydrogen sorption reactions. The hydrogen storage

properties can be tailored by addition of small amount of transition metal oxides (TiO_2,VO_2). In order to understand the processes that occurred during sorption reaction we have used both theoretical and experimental approach to study reaction mechanism in powder and thin films materials. Processes taking place during hydrogen desorption from Mg/MgH_2 thin films upon modification either by TiO_2 capped layer or by ion irradiation were also investigated. Irradiation was used to produce controlled point defects quantity with well-defined depth distribution. It was shown that the size, shape, and concentration of Mg nuclei formed during hydrogen desorption from MgH_2 thin films depend on the characteristics and distribution of the induced defects. Addition of VO_2 to powder milling bland dramatically improves the kinetics of sorption reaction, It is worth to notice that the full charge/discharge is achieved at relatively low temperatures.

ORL-OGE 1

Dissolution properties of bioactive glasses containing strontium

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Because of their potential application in bone tissue repair and regeneration, different types of bioactive glasses have been extensively studied. This study has been focused on examination of the dissolution process of two bioactive glass compositions, $42P_2O_5{\cdot}40CaO{\cdot}5SrO{\cdot}10Na_2O{\cdot}3TiO_2$ (GSSR5) and $46P_2O_5{\cdot}40CaO{\cdot}SrO{\cdot}10Na_2O{\cdot}3TiO_2$ (GSSR1) (mol %). Powdered glass samples were immersed in simulated body fluid (SBF) and kept in a water bath at 37 ºC for 21 days under semi-dynamic conditions. The mass loss of glass, normalized concentration of ions and pH values of solutions were determined. Dissolution rates for both glasses were increasing until the 5h mark and after that time the dissolution rates decreased. After the 48h glass dissolution rates reached the steady state. Measured dissolution rates after 168h for GSSR5 and GSSR1 were $1{,}13{\cdot}10^{-4}$ gh^{-1} and $3{,}61{\cdot}10^{-4}$ gh^{-1}, respectively.

ORL-NB 1

Electrical characterization and humidity sensing potential of NiZn ferrite nanoparticles

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In recent years, the ferrite nanoparticles are being increasingly recognized as materials for potential applications in humidity sensors. For these technological applications, it is necessary to focus mainly on their electrical properties rather than magnetic properties. The aim of this study is to investigate the electrical properties and humidity sensing potential of $Ni_{0.5}Zn_{0.5}Fe_2O_4$ nano-