Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION IX
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, 20-21. September 2021.

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Book title: Serbian Ceramic Society Conference - ADVANCED CERAMICS AND APPLICATION IX Program and the Book of Abstracts

Publisher:
Serbian Ceramic Society

Editors:
Prof.dr Vojislav Mitić
Dr Lidija Mančić
Dr Nina Obradović

Technical Editors:
Ivana Dinić
Marina Vuković

Printing:
Serbian Ceramic Society, Belgrade, 2021

Edition:
100 copies

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

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

SRPSKO KERAMIČKO DRUŠTVO. CONFERENCE ADVANCED CERAMICS AND APPLICATION : NEW FRONTIERS IN MULTIFUNCTIONAL MATERIAL SCIENCE AND PROCESSING (9 ;2021 ; BEOGRAD)
Program ; and the Book of abstracts / Serbian Ceramic Society Conference Advanced Ceramics and Application IX : New Frontiers in Multifunctional Material Science and Processing, Serbia, Belgrade, 20-21. September 2021 ; [organized by] Serbian Ceramic Society ... [et al.] ; [editors Vojislav Mitić, Lidija Mančić, Nina Obradović]. - Belgrade : Serbian Ceramic Society, 2021 (Belgrade : Serbian Ceramic Society). - 93 str. : ilustr. ; 30 cm

Tiraž 100.

ISBN 978-86-915627-8-6

а) Керамика -- Апстракти б) Наука о материјалима -- Апстракти в) Наноматеријали -- Апстракти

COBISS.SR-ID 45804553

P

Structural and electrochemical properties of gamma LiV_2O_5 cathode

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For its capability to reversibly remove and insert lithium ions in the range of $0 \leq x \leq 1.4$, gamma polymorph phase of $Li_xV_2O_5$ makes a solid candidate for cathode application in rechargeable batteries. Accommodation of lithium in concentrations higher than $x \approx 1.4$ brings stability issues related to the transformation towards the metastable ζ phase, which significantly limits utilization of higher capacities the material could achieve. The presented investigation has been conducted on γ-LiV_2O_5 powder obtained via solid state reaction at high temperatures. Structural refinement of the prepared γ phase has been carried out. Based on bond valence analysis of γ as well as of metastable γ' and ζ phase, which occur at low and high lithium concentrations, respectively, mechanism is proposed for the observed capacity decrease. Electrochemical characteristics of γ-LiV_2O_5 were investigated in both aqueous and organic electrolyte in the voltage range 4-2.3 V vs. Li^+/Li in order to record performances of all three occurring phases, γ and both lithium poor γ' (high voltage region) and lithium rich ζ (low voltage region). Ionic exchange of Li^+ with Mg^{2+}, Ca^{2+} and Al^{3+} in their respective aqueous electrolytes has been conducted to examine potential use of the material in the post-lithium rechargeable batteries.

P

The effect of hydrothermal synthesis parameters on cation-doped calciumhydroxyapatite

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Calcium hydroxyapatite (HAP) presents the main mineral component of human bones and teeth, and thus is widely used bioceramic material for thehard tissue repair and regeneration. The biological HAP is never found pure in nature butdoped with multiple therapeutic ions, such as Cu, Mg, Sr, Zn, etc., which are found to play important roles in bone metabolism and growth. Hence, foreign cations have been introduced into the synthetic calcium

hydroxyapatite, in order to induce a specific biological response after implementation, such as osteogenesis, angiogenesis, improved cell attachment and proliferation. However, the presence of the cations leads to the lattice distortion of the calcium-hydroxyapatite, resulting in different physico-chemical and mechanical properties. The hydrothermal synthesis of calcium hydroxyapatite leads to nanosized rod-like particles, which were found to possess properties close to those of the biological HAP. The aim of this study was to investigate the effect of hydrothermal synthesis parameters on physico-chemical and mechanical properties of mono- and binary cation-doped calcium hydroxyapatite by employing XRD, SEM and Hardness by Vickers tests. The temperature applied during the hydrothermal synthesis (150-180 °C) was found to influence the hardness of the HAP based compacts sintered at 1200 °C.

P

Electrochemical characterization of cobalt phases onto alumina supported cobalt catalysts

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This work describes the possible application of cyclic voltammetry (CV) for obtaining information about cobalt phases onto alumina supported cobalt catalysts.Starting from the same amount of ingredients, two catalysts with different phases of cobalt were prepared: Co_3O_4-A obtained by manual grinding of Co_3O_4 and alumina in an agate mortar and $CoAl_2O_4$-A obtained mechanochemically using a planetary ball mill.The final productswere characterized by the temperature-programmed reduction (TPR) and CV. The TPR profile of Co_3O_4-A showed peaks between 200–500°C characteristic of Co_3O_4 reduction, while the profile of $CoAl_2O_4$-A was altered in the whole temperature region and especially by the appearance of new peaks in the region of temperatures of 600–900°C.This result indicated that a certain amount ofhard-to-reduce cobalt aluminate is generated during milling. CVin alkaline solution revealed that theoxidation/reduction of cobalt in $CoAl_2O_4$-Aoccurred at more negative potentials compared with cobalt in Co_3O_4-A.Negative shift of peak potential well correlated with the appearance of high-temperature TPR peak and could be ascribed to the cobalt phase which has lower tendency to get reduced. These findings encourage the idea of using the CV as low cost and rapid assay for distinguishing the cobalt phases onto alumina.