Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION X
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, 26-27. September 2022.

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

Publisher:
Serbian Ceramic Society

Editors:
Dr. Nina Obradović
Dr. Lidija Mančić

Technical Editors:
Dr. Suzana Filipović
Dr. Adriana Peleš Tadić
Dr. Jelena Živojinović

Printing:
Serbian Ceramic Society, Belgrade, 2022.

Edition:
120 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 (10 ; 2022 ; Beograd)
Program ; and the Book of abstracts / Serbian Ceramic Society Conference Advanced Ceramics and Application X New Frontiers in Multifunctional Material Science and Processing, Serbia, Belgrade, 26-27. September 2022. ; [editors Nina Obradović, Lidija Mančić]. - Belgrade : Serbian Ceramic Society, 2022 (Belgrade : Serbian Ceramic Society). - 96 str. : ilustr. ; 30 cm

Tiraž 120.

ISBN 978-86-915627-9-3

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

COBISS.SR-ID 74827529

P15

Formation of nitride powders by carbothermal reduction- nitridation of diatomite

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In the synthesis of silicon nitride (Si_3N_4) based powders by carbothermal reduction-nitridation of diatomaceous earth, the effects of addition of silicon nitride powder on the phase composition, particle size and shape were investigated in this paper. Activated carbon was used as carbon sources. In order to obtain better quality Si_3N_4 powder in a faster and more efficient way, α-Si_3N_4 powder was introduced into starting mixtures as seeds. The starting mixtures of diatomaceous earth, carbon source and commercial α-Si_3N_4 powder (5,10,15 and 20 wt.%) were thermally treated at 1350 °C and 1450. X-ray diffraction (XRD), infrared spectroscopy with Fourier transform (FTIR) and scanning electron microscopy (SEM) were employed to characterize the phases, functional groups, microstructure of the obtained powders. The major reduction of diatomaceous earth took place at 1450 °C. At 1350 °C particles retained the morphological characteristics of the starting diatomaceous earth. At 1450 °C, observed particles possess a polygonal habitus, which is characteristic for silicon nitride crystals.

P16

Crosslinking of rare earth ions into aluminosilicate inorganic polymer

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Rare earth oxides have been broadly utilised in different research areas due to their unique properties. This research aims to examine the effect of Nd and Sm in the form of oxide addition in the metakaolin-based geopolymer matrix. Metakaolin-based geopolymers with the addition of different percentages of Sm_2O_3 and Nd_2O_3 (S_1-S_6) were synthesised. Samples contained 0.1% Sm; 1% Sm; 5% Sm, and 0.1% Nd, 1% Nd, and 5% Nd. The focus was on monitoring the polymerisation process using the DRIFT method for 7, 14, 21 and 28 days. The phase composition of the samples was confirmed by the XRD method, while the morphology of the samples was analysed by SEM analysis. After 28 days, due to the polymerisation process, the binding of Neodymium and Samarium ions were incorporated into the structure.