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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INV6
Dense pollucite ceramics obtained by hot-pressing as a potential matrix for the immobilization of cesium ions

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A simple one-step method with direct thermal conversion at lower temperatures for removing Cs ions from water and incorporating them into a stable crystal structure that is ready for safe and permanent disposal was described. This stable structure is the one Cs-aluminosilicate phase known as pollucite. Cs-exchanged X zeolite was hot-pressed at temperatures ranging from 800 to 950 ºC to obtain dense pollucite ceramics. It was found that hot pressing decreases the temperature of pollucite synthesis and suppresses the possible volatilization of Cs ions. The influence of sintering temperature on density, phase composition, and mechanical properties was studied. The highest value of density (93 %TD) and compressive strength (79 MPa) was obtained in pollucite hot-pressed at 950 ºC for 3 h. Observation using SEM-BSE shows the heterogeneity of dense ceramics. The pollucite hot-pressed at 950 ºC had a low linear thermal expansion coefficient (4.67×10^{-6} K^{-1}) and showed excellent resistance to Cs leaching. Based on these results one can conclude that hot pressing is the promising method for the permanent disposal of Cs radionuclides.

INV7
Imperfections in graphene and their role in energy related applications: DFT insights

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Ever since its experimental discovery, graphene has been considered a promising material for various applications, and a significant amount of effort has been put into production of high-purity graphene. With the rising need for new, sustainable energy solutions, the energy related applications of graphene have become a focal point of many research group. When it comes to novel electrochemical energy systems, pristine graphene is not the most desirable electrode material, since its reactivity towards species of interest is relatively low (e.g. towards metal ions, for metal-ion battery applications). Introduction of different defects and functional groups into/onto graphene basal plane leads to a change of its geometric and electronic structure, and consequently its reactivity as well. This change is higly dependent on the type and concentration of the introduced defects. Density Functional Theory (DFT) offers theoretical insights into the effects of different dopants on the aforementioned properties of materials. In this talk, an overview of the properties of graphene with various types of defects will be given, including reduced graphene oxide, substitutionally doped graphene and various types of N-containing defects.