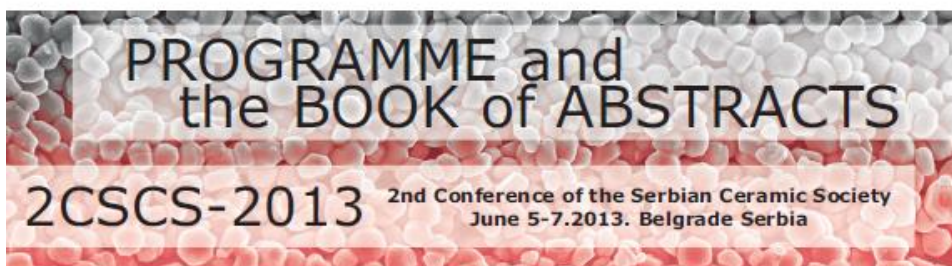


The Serbian Ceramic Society
The Academy of Engineering Sciences of Serbia
Institute for Multidisciplinary Research - University of Belgrade
Institute of Physics - University of Belgrade
Vinča Institute of Nuclear Sciences - University of Belgrade



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Snežana Bošković
Vladimir V. Srdić
Zorica Branković

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Dr Snežana Bošković
Prof. Vlaimir V. Srdić
Dr. Zorica Branković

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**COMPARISON OF NATURAL RADIOACTIVITY AND
PHYSICO-CHEMICAL PROPERTIES OF CLINIOPTIOLITE
AND SYNTHETIC ZEOLITE**

Snežana Nenadović^{1*}, Mia O. Omerašević¹, Ljiljana M. Kljajević¹, Bojan
Šešlak², Ivana Vukanac², Vladimir Pavlović³

¹Laboratory for Material Science, Institute of Nuclear Sciences "Vinča",
University of Belgrade, Serbia

²Laboratory for Nuclear and Plasma Physics, Institute of Nuclear Sciences
"Vinča", University of Belgrade, Serbia

³Institute of Technical Sciences of the Serbian Academy of Sciences and Arts,
Knez Mihailova 35/IV, University of Belgrade, Serbia

The content of naturally occurring radionuclides ²³⁸U, ²³²Th and ⁴⁰K in two natural clinoptilolite (originated from sites in Serbia and Bosnia and Herzegovina) and synthetic zeolite A4 were measured. The obtained results and the effect of structural changes caused by physicochemical properties of zeolite are presented in this paper. The structure has been characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and X-ray fluorescence. The specific activity of ²³⁸U, ²³²Th and ⁴⁰K of different samples was determined by gamma spectrometry using the HPGe semiconductor detector and obtained values ranged from 28 to 44 Bqkg⁻¹ for ²³⁸U, from 59.4 to 71.4 Bqkg⁻¹ for ²³²Th and from 335 to 517 Bqkg⁻¹ for ⁴⁰K.

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**SYNTHESIS AND CHARACTERIZATION OF Fe-DOPED
MULLITE**

Svetlana Ilić, Slavica Zec, Ana Radosavljević - Mihajlović,
Vesna Maksimović, Maja Kokunešoski, Branko Matović

*Institute of Nuclear Science "Vinča", Materials Sci. Lab., University of
Belgrade, Serbia*

Amorphous powders which composition corresponds to Fe-doped 3:2 mullite (3Al₂O₃·2SiO₂) powders were prepared by sol-gel combustion process using ethanol-water solutions of TEOS, Al(III) nitrate, Fe(III) nitrate and urea. The gel was heated on a hot plate in order to evaporate solvents and initiate combustion

process. The obtained powders were heat treated at 800 °C for 4 h to remove retained organic substances. Afterwards, the powders were uniaxially pressed into pellets and sintered at 1550 °C for 4 h to produce mullite solid solutions. The obtained compositions with up to 15 wt.% of Fe₂O₃ were investigated. XRD analysis confirmed that the powders were amorphous while sintered samples depicted single mullite phase. Also, the lattice parameters of mullite increase with increasing Fe content due to replacement of Al³⁺ - by larger Fe³⁺ -ions in crystal structure. TGA/DSC analysis showed a decrease of crystallization temperature of Fe-doped mullite. Density of sintered samples have increased with enhanced Fe content. Microstructure and composition of powder particles as well as sintered pellets were examined by SEM and EDAX. SEM images indicate that powder particles are highly agglomerated while the grains of sintered pellets have a rod-like shape.

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NANOSTRUCTURED Fe₂O₃/TiO₂ THICK FILMS

O.S. Aleksic¹, Z.Z. Djuric², M.V. Nikolic¹, N. Tasic¹, M. Vukovic¹,
Z. Marinkovic-Stanojevic¹, N. Nikolic¹, P.M. Nikolic²

¹*Institute for Multidisciplinary Research, University of Belgrade, Serbia*

²*Institute of Technical Sciences of SASA, Belgrade, Serbia*

Thick films of nanostructured pure TiO₂, α-Fe₂O₃, Fe₂O₃/TiO₂ (ratio 2:3 and 3:2) and a hetero-junction in the form of a TiO₂ layer over a Fe₂O₃ layer have been fabricated by screen printing technology on a glass substrate. The pastes used for film preparation were obtained by adding an organic vehicle to the oxide powders together with a small percentage of binding glass frit. Samples were dried up to 100°C and sintered at 650°C/60 minutes. Structural, morphological and optical studies have been carried out using XRD, SEM, EDS analysis and UV/Vis spectroscopy. Fe₂O₃/TiO₂ thick films had a homogenous nanostructure and no new compounds were formed. Indirect band gaps were determined from the measured transmission spectra.