



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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Dr. Nina Obradović

Dr. Lidija Mančić

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Dr. Suzana Filipović

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Dr. Jelena Živojinović

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- Basic Ceramic Science & Sintering
- Nano-, Opto- & Bio-ceramics
- Modeling & Simulation
- Glass and Electro Ceramics
- Electrochemistry & Catalysis
- Refractory, Cements & Clays
- Renewable Energy & Composites
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Piezoelectric And Pyroelectric Properties Of Fe/Pb/Zr-co-doped Barium Titanate Ceramics

Nemanja Stojanović¹, Aleksandra Kalezić-Glišović¹, Nina Obradović², Vesna Lojpur³,
Željka Kesić⁴, Aleksa Maričić¹

¹Joint Laboratory for Advanced Materials of SASA, Section for Amorphous Materials, Faculty of Technical Sciences Čačak, University of Kragujevac, 32102 Čačak, Serbia

²Institute of Technical Sciences, Serbian Academy of Sciences and Arts, Knez Mihailova 35/IV, 11000 Belgrade, Serbia

³Department of Atomic Physics, Institute of Nuclear Sciences “VINČA”, National Institute of the Republic of Serbia, University of Belgrade, Mike Petrovića Alasa 12-14, 11351 Vinča, Belgrade, Serbia

⁴University of Belgrade, Faculty of Technology and Metallurgy, Karnegijeva 4, 11000 Belgrade, Serbia

Powdery mixtures of 50 mass% Fe, 4 mass% Pb, 3 mass% Zr and 43 mass% BaTiO₃ were mechanochemically activated via planetary ball mill for time periods spanning from 30 min to 300 min and subsequently sintered for 2 hours at 1200 °C in the dynamic atmosphere of air. Of all the samples, the one activated for 270 min exhibited the most prominent piezoelectric effect of up to 1.17 mV under the applied pressure of 113 kPa with the relaxation time of 85 s. The pressure dependence of voltage showed three successive, distinct domains in which the voltage rise differed, with the rate of 0.09 mV/kPa in the initial one (ranging from 0.00 kPa to 5.66 kPa of the external pressure), 0.01 mV/kPa in the second one (from 5.66 kPa to 56.60 kPa) and ultimately the plateau occurring from approximately 60 kPa onwards. When heated to 200 °C, the same sample manifested the biggest pyroelectric effect as well, being 0.55 mV with no external field applied, as well as 1.04 mV when subjected to the homogenous magnetic field of 50 kA/m, thus yielding a 89% net increase of the incited voltage observed.

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Development of thermoelastic transmission conditions across a thin interface

Shubhra Pande^{1,2,*}, Andrea Piccolraoz¹, Séverine Romero Baivier²

¹University of Trento Via Mesiano, 77, 38123 Trento TN, Italy

²Vesuvius Group Rue de Douvrain 17, 7011 Ghlin, Belgium

Refractory devices composed of ceramics are employed wherever there is contact with molten metals as in crucibles filters, furnaces or systems for flow control. The mechanical properties of these materials are very different from metals. The presentation focuses on basic equations related to thermal and mechanical transmission conditions across an interface between two different materials. These equations are linked to the development of material instabilities and crack propagation within the ceramics, in the view of application to refractories operating at high-temperature conditions in steel plants.