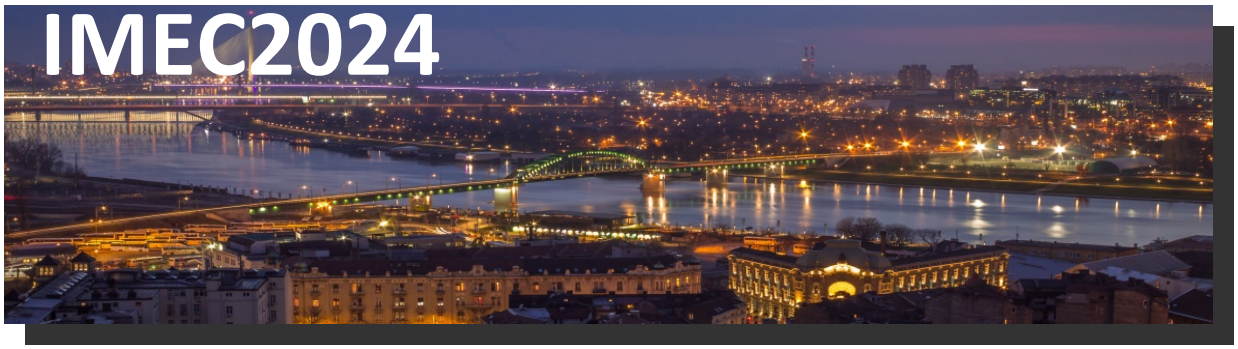
2nd International Conference on Innovative Materials in Extreme Conditions



PROGRAM

and

BOOK OF ABSTRACTS

20-22 March 2024

Belgrade, Serbia

2nd International Conference on Innovative Materials in Extreme Conditions

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Program and Book of Abstracts of the 2nd International Conference on Innovative Materials in Extreme Conditions (IMEC2024) publishes abstracts from the field of material science, physics, chemistry, earth, and computational science on the phenomena arising during the processing and/or exploitation of the innovative materials, which are presented at the international conference on innovative materials in extreme conditions.

Editors-in-Chief
Dr. Rer. Nat. Branko Matović
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Dr. Vesna Maksimović
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Preface

Dear conference participants and readers, we have the pleasure to welcome you all to Belgrade, Serbia, as the venue for the 2nd International Conference on Innovative Materials in Extreme Conditions (IMEC2024). This event is jointly organized by the Serbian Society for Innovative Materials in Extreme Conditions (SIM-EXTREME), the Center of Excellence "Center for Synthesis, Processing and Characterization of Materials for Application in Extreme Conditions - CEXTREME LAB" of the Vinča Institute of Nuclear Sciences - National Institute of the Republic of Serbia, University of Belgrade, and the Faculty of Mechanical Engineering, University of Belgrade.

The scope of the IMEC2024 is to become the worldwide forum for discussion of experts and young researchers on the phenomena arising during the processing and/or exploitation of the innovative materials. The IMEC2024 conference is focused on the current research in the field of material science, physics, chemistry, earth, and computational science. Experimental and computational investigations of materials obtained or operated under extreme conditions presented during the conference are highlighting recent progress in the development of the innovative materials at high pressures, under high magnetic and electric fields, over a wide range of temperatures, radiation conditions, corrosive environments, under extreme mechanical loads, and non-equilibrium thermodynamic conditions. The interrelation between external effects, microstructural characteristics, and material properties is considered on the experimental and theoretical level to obtain new or enhanced insights into the material behavior and their application.

We want to use this opportunity to thank our sponsors and co-organizers for helping us to successfully organize the IMEC2024 conference. First of all, we want to mention that the Ministry of Science, Technological Development and Innovation of the Republic of Serbia recognized our conference as an important event and gave their financial endorsement. Also, we want to thank the Vinča Institute of Nuclear Sciences – National Institute of the Republic of Serbia, University of Belgrade, for their strong financial support. We especially appreciate the support of the Royal Family of Serbia and the Serbian Royal Palace. In the end, we would like to thank all the members of the Conference Advisory Board, the Conference International Scientific Committee, and the Conference Organizing Committee who participated in the preparations of the IMEC2024 conference.

Editors

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Enhancement of weak ferromagnetism, exotic structure prediction and diverse electronic properties in bismuth ferrite and holmium-substituted multiferroic bismuth ferrite

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Bismuth ferrite (BFO, $BiFeO_3$), exhibiting both ferromagnetic and ferroelectric properties at room temperature, is one of the most researched multiferroic materials with a growing number of technological applications. In the present study, using a combined theoretical-experimental approach, we have investigated the BFO and the influence of Ho-doping on BFO structural, electronic and magnetic properties. Well crystallized single-crystal $BiFeO_3$ and $Bi_{1-x}Ho_xFeO_3$ nanopowder has been successfully synthesized with the hydrothermal method. The phase composition of the synthesized samples was determined by the x-ray diffraction (XRD) analysis, and the results showed that synthesized material crystallizes in the space group R3c. In addition, a structure prediction has been performed and 11 additional $BiFeO_3$ modifications have been proposed. After structure prediction of Ho-doped $BiFeO_3$ using bond valence calculations (BVC) calculations six most favorable candidates were found: α-, β-, γ-, R-, T1, and T2.The magnetic behavior of the synthesized materials was investigated using a SQUID magnetometer equipped with an oven. The plethora of magnetic and electronic properties of the Ho-doped BFO that our theoretical research predicted can open rich possibilities for further investigation and eventual applications.

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