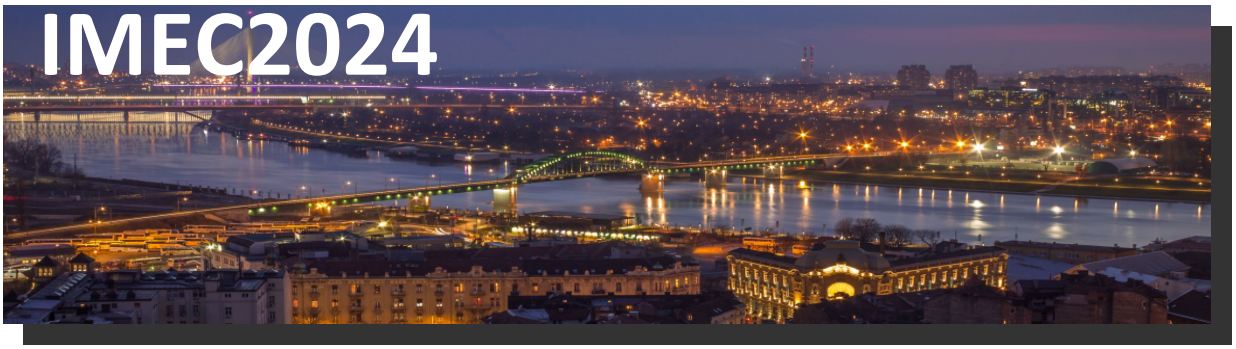
2nd International Conference on Innovative Materials in Extreme Conditions



PROGRAM

and

BOOK OF ABSTRACTS

20-22 March 2024

Belgrade, Serbia

2nd International Conference on Innovative Materials in Extreme Conditions

PROGRAM

and

BOOK OF ABSTRACTS

20-22 March 2024

Belgrade, Serbia

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
Dr. Ivana Cvijović-Alagić
Dr. Vesna Maksimović
Dr. Dejan Zagorac

Publisher
Vinča Institute of Nuclear Sciences - National Institute of the Republic of Serbia, University of Belgrade
Serbian Society for Innovative Materials in Extreme Conditions (SIM-EXTREME)

Printing layout
Dr. Ivana Cvijović-Alagić

Press
Donat Graf d.o.o., Vučka Milićevića 29, 11306 Grocka, Belgrade, Serbia

ISBN 978-86-7306-171-9

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

66.017/.018(048)

INTERNATIONAL CONFERENCE ON INNOVATIVE MATERIALS IN EXTREME CONDITIONS
(2 ; 2024 ; BEOGRAD)
Program ; and the Book of abstracts / 2nd International Conference on Innovative Materials in Extreme Conditions [i. e.] [(IMEC2024)], 20-22 March 2024 Belgrade, Serbia ; [organizers Serbian Society for Innovative Materials in Extreme Conditions (SIM-EXTREME) [and] University of Belgrade, Vinča Institute of Nuclear Sciences - National Institute of the Republic of Serbia, Center of Excellence "Center for Synthesis, Processing and Characterization of Materials for Application in Extreme Conditions" (CEXTREME LAB) [and] University of Belgrade, Faculty of Mechanical Engineering] ; [editors-in-chief Branko Matović ... [et al.]]. - Belgrade : University, Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia : Serbian Society for Innovative Materials in Extreme Conditions [i. e.] (SIM-EXTREME), 2024 (Belgrade : Donat Graf). - 82 str. : ilustr. ; 30 cm

Tiraž 70. - Str. 3: Preface / editors. - Bibliografija uz pojedine apstrakte. - Registar.

ISBN 978-86-7306-171-9 (VINS)

а) Наука о материјалима -- Апстракти б)
Технички материјали -- Апстракти

COBISS.SR-ID 139413001

ORGANIZERS

Serbian Society for Innovative Materials in Extreme Conditions (SIM-EXTREME)

Center of Excellence "Center for Synthesis, Processing and Characterization of Materials for Application in Extreme Conditions" (CEXTREME LAB), Vinča Institute of Nuclear Sciences - National Institute of the Republic of Serbia, University of Belgrade

Faculty of Mechanical Engineering, University of Belgrade

SPONSORS

Vinča Institute of Nuclear Sciences - National Institute of the Republic of Serbia, University of Belgrade

Ministry of Science, Technological Development and Innovation of the Republic of Serbia

The Royal Family of Serbia / The Royal Palace

ANALYSIS
LABORATORY EQUIPMENT

Analysis doo

Chair

Prof. Dr. Rer. Nat. Branko Matović	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*

Advisory Board

Prof. Dr. Rer. Nat. N.V.Ravi Kumar	*Indian Institute of Technology Madras, India*
Dr. Miladin Radović	*Department of Materials Science and Engineering, Texas A&M University, USA*
Assoc. Prof. Dr. Claus Rebholz	*Department of Mechanical and Manufacturing Engineering, University of Cyprus, Cyprus*
Prof. Gordana Bakić	*Faculty of Mechanical Engineering, University of Belgrade, Serbia*
Prof. Pavol Šajgalìk	*Institute of Inorganic Chemistry, Slovak Academy of Sciences, Slovakia*
Prof. Lidija Ćurković	*Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, Croatia*
Dr. Vladimir Urbanovich	*Centre of Science and Practice of Materials, National Academy of Sciences of Belarus, Belarus*
Dr. Alexandra Kovalčíková	*Institute of Materials Research, Slovak Academy of Sciences, Slovakia*

International Scientific Committee

Dr. Tetiana Prikhna	*V. Bakul Institute for Superhard Materials, National Academy of Sciences of Ukraine, Ukraine*
Dr. Ivana Cvijović-Alagić	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
Dr. Enikő Volceanov	*Metallurgical Research Institute, Politehnica University of Bucharest, Romania*
Dr. Peter Tatarko	*Institute of Inorganic Chemistry, Slovak Academy of Sciences, Slovakia*
Dr. Rer. Nat. Matej Fonović	*Faculty of Engineering, University of Rijeka, Croatia*
Dr. Vesna Maksimović	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
PD Dr. Rer. Nat. Emanuel Ionescu	*Fraunhofer-Einrichtung für Wertstoffkreisläufe und Ressourcenstrategie IWKS, Germany*
Dr. Jelena Zagorac	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
Prof. Miloš Đukić	*Faculty of Mechanical Engineering, University of Belgrade, Serbia*
Dr. Manuel Gruber	*Montanuniversität Leoben, Austria*

Organizing Committee

Dr. Rer. Nat. Dejan Zagorac	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
Dr. Maria Čebela	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
Emilija Nidžović	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
Dr. Vladimir Pavkov	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
Dr. Jelena Stašić	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
Milan Pejić	*Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*
Dr. Marija Prekajski Đorđević	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade*
Tamara Škundrić	*Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*

Scientific Secretary

Dr. Jelena Maletaškić	*Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences, University of Belgrade, Serbia*

TABLE OF CONTENTS

Enhanced aluminum matrix composites for structural applications

Ivana Cvijović-Alagić[1], Jelena Maletaškić[1], Vladimir Pavkov[1], Slaviša Putić[2], Branko Matović[1], Vesna Maksimović[1]

[1]Center of Excellence "CEXTREME LAB", Vinča Institute of Nuclear Sciences - National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia
[2]Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia

Modern industrial practice should be in compliance with the green agenda and strongly support ecological sustainability through the achievement of zero-waste industrial production. In that regard, industrial production is nowadays focused on the reuse of industrial wastes for the attainment of new functional materials and products. Therefore, the obtainment of cost-effective and highly efficient technological procedures for the production of damage-resistant structural components with prolonged life cycles is of great importance.

Accordingly, the scope of the present research was to obtain inexpensive structural composite materials with enhanced properties through the industrial waste recycling process. Namely, to produce lightweight and highly durable structural components for application in the transportation industry the metallic waste, derived from the industrial machining of aluminum alloys, and inexpensive basalt fibers, obtained by the recycling of stone wool used as thermo-insulation materials in the building and construction industry, were foreseen as raw materials for the fabrication of aluminum matrix composites (AMCs). As the AMC matrix, the waste aluminum 2024 alloy chips were chosen and ball-milled to obtain a powder with homogeneous particle distribution. The basalt fibers from waste stone wool were used as composite reinforcements and before their mixing in a 3D tumbler mixer with Al alloy powder two different ratios, *i.e.* Al alloy : basalt fibers = 90 : 10 and Al alloy : basalt fibers = 80 : 20, were rinsed and subjected to thermal treatment. The prepared mixtures were subjected to Spark Plasma Sintering (SPS) at 500 ^{o}C under the pressure of 50 MPa and subsequent annealing at 550 ^{o}C to obtain the desired microstructure. Full characterization of the obtained AMCs was conducted using scanning electron microscopy (SEM), microhardness measurements, and X-ray diffraction (XRD) analysis. Moreover, the thermal diffusivity and thermal capacity investigations were conducted to determine the thermal conductivity of produced AMCs. The attained results showed that significant enhancement of the starting 2024 alloy's properties was achieved. In particular, it was determined that the obtained AMCs hardness and thermal conductivity are significantly improved when compared with the starting 2024 aluminum alloy.

Acknowledgments: This work was financially supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia and the OeAD - Austria's Agency for Education and Internationalization through the Bilateral Serbia-Austria Scientific and Technological Cooperation Program (Contract No. 337-00-577/2021-09/39).