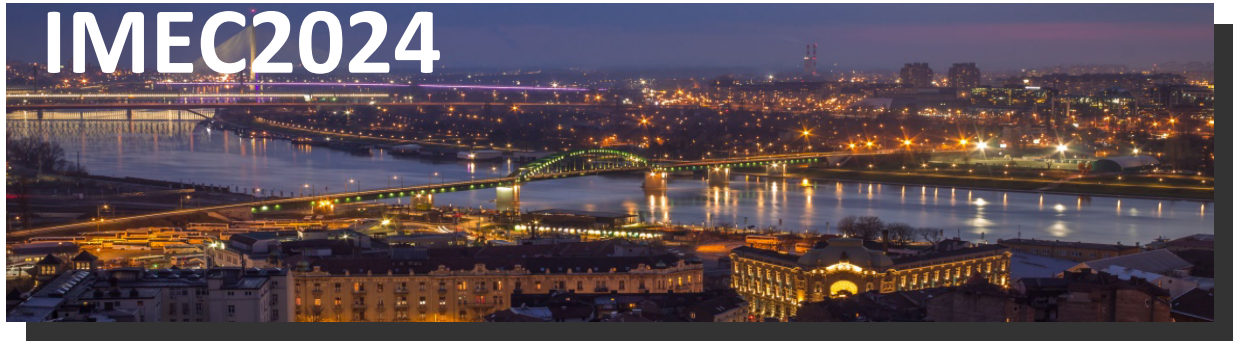


**2nd International Conference on Innovative Materials
in Extreme Conditions**



**PROGRAM
and
BOOK OF ABSTRACTS**

20-22 March 2024

Belgrade, Serbia

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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.

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Enhanced aluminum matrix composites for structural applications

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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 °C under the pressure of 50 MPa and subsequent annealing at 550 °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.

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