

## Lightweight carbon fibre magnesium-based composites

Juraj Koráb\*, Stanislav Kúdela Jr., Pavol Štefánik and František Simančík

Institute of Materials and Machine Mechanics, Slovak Academy of Sciences, Slovak Republic  
ummskora@savba.sk, pavol.stefanik@savba.sk, stanislav.kudela@savba.sk, ummssima@savba.sk

*\*Corresponding author: J. Koráb, Institute of Materials and Machine Mechanics, Slovak Academy of Sciences, Dúbravská cesta 9/6319, 845 13, Bratislava, Slovak Republic, juraj.korab@savba.sk, <https://orcid.org/0000-0001-9864-2586>*

### **ABSTRACT**

The paper deals with the preparation of a lightweight composite with a metal matrix based on technically pure magnesium reinforced with continuous carbon fibres (CF). Gas pressure infiltration of molten metal into a fibrous pre-form was used for preparation of composite samples. One of the main aims of the work was to characterise mechanical properties of the composite material in longitudinal direction, related to fibres. The four-point bending test was used for characterisation of the strength and stiffness and the Dynamic Mechanical Analysis was used for non-destructive stiffness characterisation. Another aim of the work was to achieve good interfacial bond by forming stable carbides using with partially soluble or non-soluble elements in solid magnesium (Zr, Si, Y).

The material bending strength was at the level of 650 - 700 MPa and a stiffness of 250 - 350 GPa. Obtained values were approximately by 25% less than those given by simple calculation using the Rule of Mixtures. The developed Mg-CF composite should be able to form lightweight structures with an excellent strength-to-stiffness to weight ratio with excellent dimensional stability. Lightweight construction material should find various applications in space applications such as trusses, mast frames for launchers, platforms and planetary habitats, solar fields, fastening systems, kinematic holders, fastening elements, components for robots, rovers, etc.

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### **BIOGRAPHY**

Ing. Juraj KORÁB, PhD., is a senior research fellow at the IMMM SAS. He has 22 years of experience in the field of development of Metal Matrix Composite materials prepared by gas assisted pressure infiltration of molten metals (Cu, Al, Mg, Pb) into porous preforms (carbon fibre, graphite skeleton). In the characterization field he focuses on characterisation of thermophysical properties of composites. He has experience from industrial production of electric current collector strips for electric locomotives and trolleybuses, which he gained by working at Kompozitum Ltd. as a research worker.

