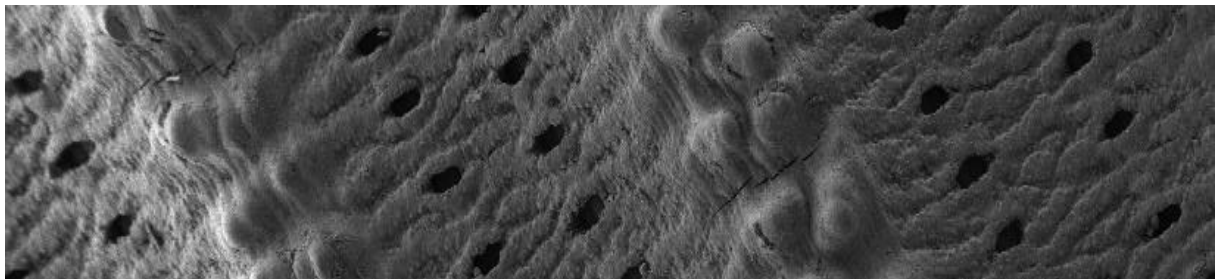


Research program

LIGHTWEIGHTPARTS AND METAMATERIALS

Research and development of lightweight materials and structures created by conventional technologies and development of metamaterials created mainly by 3D printing. Research of production and technological parameters of workability, research about application of metal and polymer foam structures. Research of metal foams, especially Al and its alloys. Research of polymeric foam structures from conventional polymers (PP, PA) or biopolymers (PLA, PHBV) by Mucell technology. Development of lightweight parts made by metallic materials with specific properties (Ti and Ni alloys), as well as special composite and biocomposite materials for targeted applications. Research of metamaterials focusing on the use of negative Poisson numbers or materials with multistable behavior. Applied research of analysis regarding suitable materials and their properties, design of optimization structures including simulation process and physical testing. Research and development of metamaterials with unique material parameters, such as high strength / weight ratio, the possibility of applying high load speeds and maintaining elastic behavior over a wide range of deformations.



Research activities

METAL AND FOAMED POLYMER STRUCTURES

- ▶ Research of lightweight metal structures and porous materials. Research on influence of parameters during direct foaming of Al and selected Al alloys (process and technological parameters, influence of mold construction). Evaluation of physical and mechanical properties regarding obtained structures including conditions of its application.
- ▶ Research of foamed polymer structures, microcell injection and chemical foaming of multifunctional polymer systems with inactive gases in terms of shape and dimensional stability of lightweight parts, their stress, physical properties, but also stability of the production process.

METAL MATERIALS

- ▶ Research and development of parts with variable physical and mechanical properties in the field of metallic materials and plastics. Transient effects of metamaterials in a very specific area of deformation of a given structure. Research on increasing the absorption capacity of a given material/structure. The main technology will be 3D printing, also with the effort to develop sandwich structures made up of different sub-components and connected, e.g. by diffusion.