Project 3.3 Artificial intelligence-assisted 3D digital manufacturing of functionally graded materials: towards the next generation of porous materials

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Unit: Digital Manufacturing of biomimetic systems
www: The new group (z. 32) will open in January 2022,

Background:

The ability of controlling the energy absorption of graded materials is of critical importance in a vast range of industrial applications that span from aerospace and construction to transportation and bioengineering. However, due to the intrinsic complexity of pFGMs and the lack of a comprehensive model for such material design, researchers working in the field have limited possibilities and often prefer to proceed with empirical trial-and-error approaches.

Aim:

The goal of this project is the development of new tools for the design and manufacturing of 3D porous functionally graded materials (pFGMs) that exhibit tailored mechanical properties, in particular pre-designed energy absorption profiles. We propose a new approach towards the design and fabrication of pFGM aimed at i) developing efficient in silico (numerical) modelling of such complex materials enabling the design of porous structures with required mechanical properties, and ii) simplifying/extending the manufacturing procedures.The approach comprises of three steps: i)IN-SILICO MODELLING, ii)DIGITAL MANUFACTURING, iii) ADVANCED MATERIAL CHARACTERIZATION.

Requirements:

- Ideal candidate has a Master degree in materials science, chemistry, physics, or similar fields.
- prior research experience in 3D printing or porous material synthesis via foam / emulsion templating will be considered a plus,

Candidate must meets any of the following criteria:

- is a student of a full-time first or second-cycle degree programme or uniform Master's studies at a university in Poland;
- is a participant in a doctoral programme;
- is a doctoral candidate at a doctoral school.
- Candidates can simultaneously apply for Warsaw PhD School in Natural and BioMedical Sciences in order to meet the criteria.

2 places available.