MICROSTRUCTURALLY GRADED MATERIALS: DESIGN AND COMPUTING

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ABSTRACT

Microstructurally architected materials have recently received a significant boost due to advent of new manufacturing techniques. These functionally graded materials are now widely employed in many fields of engineering because of their high-performance properties such as stiffness, strength, fracture toughness, shock absorption, plastic resistance, biomimetic features, thermal insulation, etc, given by their topology and hierarchical structure arrangement. For example, in the field of biomechanics, microstructurally architected materials are increasingly employed to mimic the real architecture of biological tissues. Graded lattice models, such as triply periodic or quasi-periodic minimal surfaces (TPMS), are particularly used for designing orthopaedic bone prostheses and dental implants. In civil and mechanical engineering these materials are used to create structural elements with superior mechanical properties.

This symposium is devoted to the development of functionally graded materials for several technical and industrial applications in the fields of material, mechanical and biomedical engineering and will provide a collaborative space to share expertise across several areas including (but not restricted to):

- **Structure design** and **mechanical optimization**, both theoretical and experimental, of graded structures;
- **Stochastic variability** in microstructural arranged materials
- **Advanced manufacturing techniques**, including 3D printing methods;
- **Computational methods** for analysing macroscopic mechanical responses, such as finite element method (FEM) analyses and homogenization techniques for multicomponent materials;
- **Imaging techniques** for extracting microstructural information, particularly concerning biological materials;
- **Engineering applications** in many fields (civil, aerospace, biomedical, etc)