

## F03: Cellular materials and mechanical metamaterials

Smart material concepts meet the demands of today's society for energy efficiency, resource conservation and environmental compatibility, while at the same time enabling a wide range of functional and structural purposes. Concepts, such as additivity or multi-hierarchical structuring are derived from nature and offer long-term, sustainable solutions that open up new field of applications.

Cellular materials and mechanical metamaterials exhibit outstanding structural and functional characteristics, and serve important roles in the applications such as energy storage and harvesting, environmental sensing and regulation, medical devices and structural domains, including aerospace, automotive, and architecture.

Architectural or geometrical design of cellular materials and mechanical metamaterials defines the majority of their properties and behaviors. Ever-evolving design approaches range from bioinspiration to artificial intelligence for optimization. The combination of traditional and advanced manufacturing techniques enables the implementation of the intricate designs in length scales from nanometer-scale MEMS devices to macro-scale building facades. The exceptional properties, such as high anisotropy, low tortuosity, negative stiffness, and unconventional behavior, such as auxeticity, self-sealing and self-healing, and adaptability make them key enablers in various fields.

The symposium will focus on the recent advancement of design, manufacturing, characterization and applications of these materials. Topics of interest include but are not limited to:

- Finite element modeling and machine learning assisted design
- Bioinspired hierarchical structured materials
- Cellular materials for energy, environment, and biomedical applications
- Kirigami and origami
- Microlattices and 3D architectural materials
- Additive manufacturing of cellular materials and mechanical metamaterials
- Adaptive and programmable materials and shape morphing
- Adaptive damping and energy absorption
- Surface functionality: adhesion and superhydrophobicity

### Symposium Organizer



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