Special Issue

Programmable Metallic Metamaterials: Innovations in Sustainable Design and Smart Architectures

Message from the Guest Editor

The emergence of programmable metallic metamaterials is redefining the landscape of advanced materials, structural mechanics, and sustainable design. Unlike conventional materials, these engineered architectures derive their extraordinary properties from precisely controlled geometries and compositions, enabling unprecedented tunability in stiffness, energy dissipation, negative Poisson's ratio, and self-regulating behavior. Recent advancements in additive manufacturing, computational design, and machine learning-driven optimization have expanded the scope of mechanical metamaterials, incorporating metallic structures and alloys that offer enhanced strength, durability, and multifunctionality. We invite contributions on, but not limited to, the following topics:

- Architected and responsive metallic metamaterials;
- Multi-stability, snap-through instabilities, and self-regulating structures;
- Bio-inspired, soft, and shape-memory metallic metamaterials;
- Sustainable, recyclable, and energy-efficient metamaterials;
- Computational design, topology optimization, and AI-driven metamaterial discovery.

Guest Editor

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Message from the Editorial Board

Metallic materials play a vital role in the economic life of modern societies; contributions are sought on fresh developments that enhance our understanding of the fundamental aspects related to the relationships between processing, properties and microstructure – disciplines in the metallurgical field ranging from processing, mechanical behavior, phase transitions and microstructural evolution, nanostructures, as well as unique metallic properties – inspire general and scholarly interest among the scientific community.

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