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FEBRUARY 27-MARCH 3, 2022
ANAHEIM CONVENTION CENTER & ANAHEIM MARRIOTT
ANAHEIM, CALIFORNIA, USA
#TMSAnnualMeeting

SUBMIT AN ABSTRACT FOR THE FOLLOWING TMS2022 SYMPOSIUM:

MECHANICS & STRUCTURAL RELIABILITY

Structural Metamaterials

Recent advances in additive manufacturing have enabled the development of structural metamaterials with novel combinations of mechanical properties and multifunctional capabilities. Mechanical metamaterials can be formed with properties ranging from negative Poisson's ratio and stiffness, inverted compressibility, fluid-like behavior, to programmable elastic response to mechanical stimuli. Hierarchical materials enable customization of materials with novel combinations of mechanical, optical, or electrical properties.

This symposium will focus on structural metamaterials based on metals, which include lattices, periodic surfaces, and architected composite materials. This symposium seeks to further the understanding of architected structure on properties including, but not limited to elasticity, strength, fracture, fatigue, shock, plastic flow, etc. Beyond mechanical properties, the unusual thermal, electrical, chemical, and multi-functional performance of such metamaterials are also relevant.

In addition, the symposium emphasizes the effects of the underlying base material and the manufacturing methods used to design and produce metamaterials. Effects such as surface roughness, heterogeneous microstructure, and residual stress are rarely considered in design of metamaterials but can have a profound effect on their ultimate performance and reliability.

Topics will include:

- Effects of microstructure and defects on metamaterial performance
- Manufacturing challenges associated with metamaterials
- Multi-material solutions & architected composites
- Effects of length scales on elasticity, strength, fracture, fatigue, dynamic properties, and plastic flow of metamaterials
- Changes in deformation caused by architectural features in metamaterials
- Ballistic and dynamic compression responses of metamaterials
- In-situ and ex-situ mechanical testing methodologies for metamaterials
- Modeling and simulation at all scales of mechanical behavior of metamaterials

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