

The emerging concept of mechanical meta-materials has received increasing attention during the last few years partially due to the advances in additive manufacturing techniques that have enabled fabricating materials with arbitrarily complex micro/nano-architectures. The rationally designed micro/nano-architecture of mechanical meta-materials gives rise to unprecedented or rare mechanical properties that could be exploited to create advanced materials with novel functionalities. This talk presents an overview of the recent developments in the area of mechanical meta-materials. Extremal materials that are extremely stiff in certain modes of deformation, while extremely soft in other modes of deformation are discussed first. Penta-mode, dilational, and other auxetic meta-materials are all discussed within the context of extremal materials. Negative meta-materials are presented next with special focus on materials with negative compressibility and negative stiffness. Ultra-property meta-materials are the topic of the following section that covers ultra-light, ultra-stiff, and ultra-tough materials. Finally, the emerging areas of research in mechanical meta-materials including active, adaptive, programmable, and origami-based mechanical meta-materials are reviewed.



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Mechanical metamaterials

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