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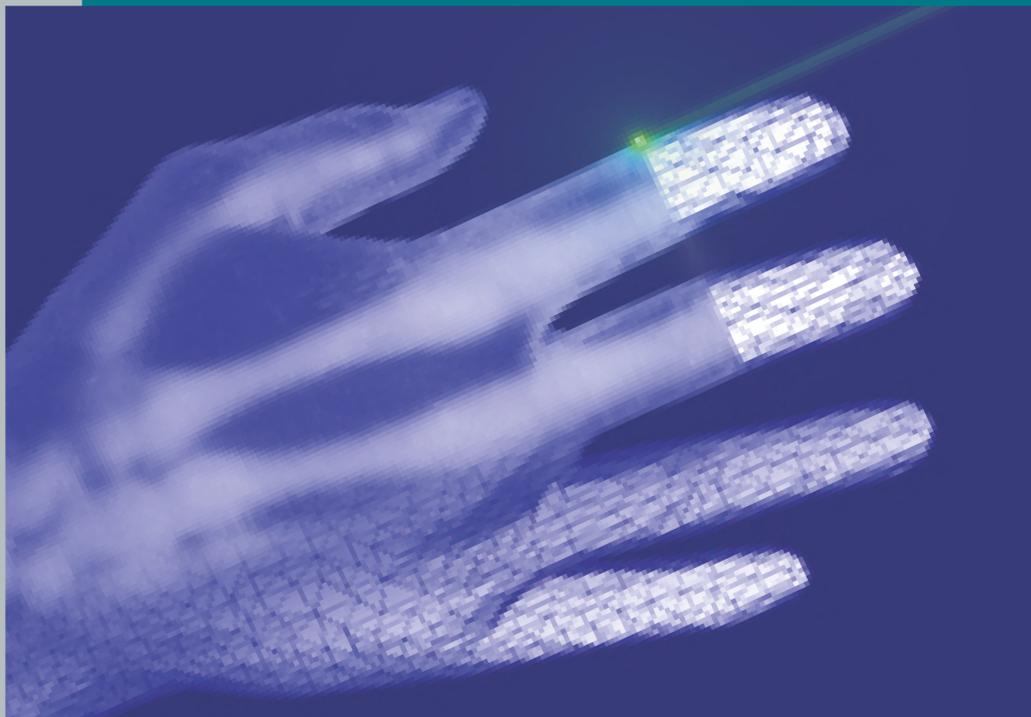
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Supplementary Abstracts

Blending computation and additive manufacturing for de novo materials design

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Abstract

The high quest for lightweight, strength, and toughness is driving the research towards the design of de novo high-performance materials. In structural applications composites generally represent the best option, offering an optimal stiffness-strength balance, combined with a low weight. Yet, their reduced toughness often represents a limitation for structural components. By solving the eternal strength-toughness dichotomy and providing a remarkable amplification of mechanical properties, natural hierarchical materials, such as bone, nacre, wood, may represent an optimal biomimetic model and continue to be a great source of inspiration for new materials design. Today blending computation and additive manufacturing allows researcher to further expand the design space, bringing it to a new level. Here we show different case studies of bio-inspired design, highlighting the effect of a specific hierarchical sub-structure on the local and global properties of the overall structure and the role of the characteristic structural features to trigger specific mechanisms.

Flavia Libonati is Associate Professor at the University of Genoa, Italy and Research Affiliate at the Italian Institute of Technology (IIT) and the Massachusetts Institute of Technology (MIT). Before she was Assistant Professor at Polytechnic University of Milan, where she also received a Ph.D. in Mechanical Engineering. Her primary research interests lie in the field of biological composites and biomimetic materials, with a special focus on the design and manufacturing of bio-inspired multifunctional materials for advanced engineering applications, through a multiscale numerical and experimental approach. She is the recipient of several awards and fellowships and a member of renowned scientific societies.

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