SOME TRENDS IN ARCHITECTURED MATERIALS

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Abstract

After a brief overview of several areas of research into architectured materials, we shall delve into topological interlocking materials and structures as one of the most promising topics. Structure at meso scale as a key factor in design of materials is well-known in materials engineering. Here we shall emphasize its qualitatively different role that becomes the governing one. As distinct from composites, which also entail specially created morphological make-up of a material (such as fibers, layers, inclusions, meshes, etc.), architectured materials are characterized by a greater variety of meso structures. This rich pallet of meso structures offers great opportunities for impacting on a material's properties in a cardinal way. The elegance and aesthetic appeal play a role not to be neglected in topological interlocking design, and the connotation with 'architecture' in this context is not unintentional. We present the principles governing the design of the known and emerging topological interlocking materials, discuss their explored and anticipated properties, and provide an outlook on their potential applications in architecture and construction industry.

Biosketch

Yuri Estrin received a MSc degree in Physics from the Moscow Institute of Physics and Engineering (1969), followed by a PhD degree from the Institute of Crystallography, Academy of Sciences of the USSR (1975) and a habilitation from the University of Technology, Hamburg-Harburg, Germany (1986). He has held professorial positions in Germany and Australia, as well as adjunct appointments in several countries. Currently, Professor Estrin is an Honorary Professorial Fellow at Monash University in Melbourne and an Adjunct Professor at the University of Western Australia in Perth. His research interests are in a broad area of physical metallurgy and design of materials. A special focus of his work is on architectured materials, including topological interlocking materials.