14th World Congress on Computational Mechanics (WCCM XIV)
8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
July 19- 24, 2020, Paris, France

COMPUTATIONAL MECHANICS AND MULTISCALE MODELING IN MANUFACTURING OF LOW-DIMENSIONAL MATERIALS AND STRUCTURES

TRACK NUMBER (1000)

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Key words: Computational Mechanics, Multiscale Modeling, Manufacturing, Nanomaterials

ABSTRACT

Low-dimensional materials and their seamless integrations with traditional materials or their own assembly into bulk quantity opens a new era in exploration of advanced materials, structures and devices with unprecedented properties and functionalities at large scale. Both synthesis of the low-dimensional nanomaterials with well-defined structures and properties at the nanoscale and integration/assembly of them into bulk form with ordered arrangements at the large scale are amongst the most paramount challenges in manufacturing. At the root of manufacturing techniques in either low-dimensional nanomaterials or their enabled large scale structures, the elementary steps rely critically on atomistic interactions and/or self-assembly and structural deformation and instability, sometimes, in a harsh environment, which is underpinned by mechanics in close integrations with chemical reactions and/or energy and mass transports. Understanding the underlying complex and multiplex mechanics mechanisms not only is crucial to optimize existing manufacturing techniques with enhanced controlling accuracy, but also will help explore new manufacturing solutions with unique capability, cost efficiency, and high precision.

This symposium aims to provide an interdisciplinary forum for discussing the mechanics that underpins manufacturing and synthesis of both low-dimensional materials at the nanoscale and their enabled advanced materials, structures and devices at the large scale. Topics are included but not limited to ***computational methods and multiscale modeling*** of:

- Mechanics in manufacturing and synthesis of 0/1/2-D nanomaterials (e.g. growth, sintering, cutting/machining, exfoliation, self-assembly, dip/flow/shear-coating)
- Mechanics-driven manufacturing of architectural structures and functional devices from low-dimensional nanomaterials (e.g. self-assembly, transfer printing, folding, collapsing, spinning, drying/evaporation, crack/buckling/delamination-driven templating techniques, 3D printing)
- Mechanics in manufacturing of heterostructures and hybridization of low-dimensional nanomaterials and traditional materials (e.g. doping, nanojunction, nanowelding/soldering, 3D printing)
- Mechanics-chemical/thermal/optical/electric/magnetic couplings in manufacturing of relevance to low-dimensional nanomaterials in various environments