

SMART SOFT MATERIALS: ADDITIVE MANUFACTURING, MODELING, DESIGN, AND EXPERIMENTATION

1500 - MATERIALS BY DESIGN

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ABSTRACT

Smart soft materials are a class of soft materials whose physical properties can be controlled by one or more external stimuli such as temperature, pH, light, electric or magnetic fields. They include, for instance, phase transforming soft materials, stimuli-responsive polymers and hydrogels. Due to their unique properties these materials can be applied in numerous applications, from automotive to medical and robotics [1]. Additive Manufacturing, often denoted as 4D Printing, has also emerged as a technological frontier in the advancement of complex parts using multi-functional soft materials [2, 3].

To further accelerate this technology towards widespread adoption, computational modelling, simulation, and design optimization are of particular importance [4]. However, they still represent a fundamental, but challenging and developing topics, due to the close connection

between the manufacturing process, material(s) functionalities, and the final design.

This Minisymposium welcomes contributions on the latest advances in modelling, simulation, and optimization of additively manufactured smart soft materials. Contributions will outline the application problem of interest and will demonstrate the theoretical, numerical, and experimental work being conducted to validate the proposed solution method. Areas of interest will include, but will not be limited to:

- Mechanical and multi-physical constitutive modelling of smart soft materials at different scales
- Modelling and control of smart soft materials and composites
- Computational simulation and discretization methods, including additive manufacturing process modelling
- Topology and design optimization for smart soft materials and composites
- Additive manufacturing and 4D printing technologies for smart soft materials
- Experimental characterization and validation methods
- Computer-aided design for smart applications

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