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Editorial

Multi-Material Additive Manufacturing for Advanced High-Tech Components

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Multi-Material Additive Manufacturing for Advanced High-Tech Components is a new open Special Issue of *Materials*, which aims to publish original and review papers regarding new scientific and applied research and make great contributions to finding, exploring and understanding novel multi-material components via additive manufacturing.

The development of multi-material components able to address a high level of multi-functionality based on distinct materials intrinsic properties might be a method of achieving unparalleled solutions for a wide range of applications. By exploiting the potential of additive manufacturing potential, new 3D multi-material solutions can be created for medical implants, aerospace components, molds, jewelry, collection coins and many other applications. Using advanced manufacturing technologies, such as laser powder bed fusion (adapted for manufacturing with different powders in 3D), different materials can be combined in a single component such as steel and copper, steel and titanium, Inconel and copper, Inconel and aluminum, titanium and cobalt, titanium and tantalum, titanium and zirconia, steel and silver, silver and gold, silver and copper, etc.

The combination of different materials in a single component can bring to life new possibilities, never studied, with tailored and combined functions (mechanical, physical or chemical properties). This technology and disruptive design philosophy are being investigated at CMEMS-UMinho, in Guimaraes–Portugal. A novel 3D multi-material design concept targeting plastic injection moulds was proposed by A. Cunha et al. [1]. This multi-material component combines the mechanical resistance of the 420 stainless steel alloy and the high thermal conductivity of copper, in a single component, fabricated in just one event by means of home-made 3D Multi-Material Laser Powder Bed Fusion equipment. Also, A. Marques et al. [2] fabricated novel Inconel 718–copper parts by 3D multi-material laser powder bed fusion targeting rocket engines. Topics of interest for this Special Issue, entitled Multi-Material Additive Manufacturing for Advanced High-Tech Components, includes, but is not limited to, the following (reviews and experimental and numerical studies are welcome): advanced additive manufacturing strategies; laser powder bed fusion; metal-based multi-material design; nature-inspired architectures and solutions via AM; multi-functional components; smart materials; topological optimization and high-efficiency solutions.

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Short Biography of Authors

Flávio Bartolomeu is currently a postdoctoral junior researcher in the Center for MicroElectroMechanical Systems (CMEMS-UMinho). He graduated in 2015 with a master's thesis regarding selective laser melting manufacturing optimization for different metallic materials. In 2016, he started his PhD in Mech, working on a thesis entitled "Smart design of multi-functional and multi-material NiTi-Ti6Al4V cellular structured implants by Selective Laser Melting". He earned his PhD in 2019. Currently, he is responsible for a research team focused on multi-material laser powder bed fusion for advanced developments: technology, fabrication and prototype validation. Flávio Bartolomeu currently has 36 ISI/Q1 journal publications with more than 1100 citations (h = 19).

F. S. Silva Being in the top 2% of the world's most influential scientists, according to Stanford University (2021), Professor F. S. Silva is a Full Professor at University of Minho and coordinates a laboratory entitled Microfabrication and Systems Integration Laboratory, with 8 PhD and 31 PhD students. He holds five patents and seven others under submission, as well as five international awards. Prof. Silva leads/has led more than 25 research projects, half with companies in applied projects. Professor Silva has 320 ISI indexed papers and h = 37 (Scopus).