



Editorial PIAM November 2022

Joamin Gonzalez-Gutierrez¹

Accepted: 11 November 2022 / Published online: 18 November 2022
© The Author(s), under exclusive licence to Springer Nature Switzerland AG 2022

Issue 05/2022 of the Progress in Additive Manufacturing Journal contains 20 articles. This issue includes studies from a wide range of additive manufacturing topics, from computer process simulations, process optimisation, specimen characterisation, new processes and applications. In the area of computer process simulations, two papers are included in this issue. One describes global local modelling of melt pool dynamics and bead formation in laser powder bed fusion (L-PBF) using a multi-physics thermo-fluid simulation. The second paper describes a model to predict and optimise the gas–powder flow convergence in coaxial powder feeding nozzles based on Computational Fluid Dynamics/Discrete Element Method (CFD-DEM).

Process optimisation received particular importance in this issue, with five papers in this field. The first paper deals with optimising time-variant laser power in a cladding process. The second paper studies the effect of part geometry and process parameters on the dimensional deviation of additively made acrylonitrile butadiene styrene (ABS) specimens. The third paper explains how process parameters for L-PBF affect the properties of silicon carbide parts. Another paper concentrates on improving the fatigue life of 3D printed structures using stochastic variations; the paper uses numerical simulations to help design structures with better dimensional accuracy. The effect of post-processing conditions is also discussed in a paper dealing with the influence of post-heat treatments on the microstructural and mechanical properties of Ti6Al4V alloy fabricated by L-PBF.

Characterising Additively Manufactured specimens is crucial to finding applications for different AM processes. In this issue, an evaluation and characterisation of nitinol stents produced by selective laser melting with various

process parameters are discussed. The elastic properties and unconventional plasticity of 316L stainless steel processed by L-PBF are presented in this issue. A third paper describes the relationship between microstructure, mechanical and magnetic properties of pure iron produced by L-PBF in the as-built and stress-relieved conditions. Further characterisation research includes an investigation of the mechanical properties of multi-material sandwich structures produced by material extrusion (MEX) and another investigation where the use of non-destructive techniques to identify defects in specimens produced L-PBF are explained. Two papers also discuss hybrid and new AM technologies in this issue. One paper describes the use of friction welding to join additively manufactured specimens made with different thermoplastics, while the second paper describes improvements to a cryogenic 3D printing device capable of producing layered 3D objects at an operating temperature between -20 and -25 °C.

Applications described in this issue are related to the medical field and are described in two papers. The first paper focuses on the optimisation of the printing parameters of a structure made by vat photopolymerisation to obtain a scaffold with the required characteristic for a proper 3D cell culture; the scaffold is the starting point for a future study regarding the aetiology and formation mechanism of eye floaters in cell culture. The second paper describes developing an irregular open-cell titanium lattice structure to mimic the human cancellous bone produced by L-PBF. Finally, this issue includes four review papers that present state of the art in additive manufacturing of corrosion of nickel-based alloys, dimensional and tolerancing of lattice structures produced by L-PBF, the applications of large format pellet-based MEX, and the complete process of L-PBF and its applications.

Dr Joamin Gonzalez-Gutierrez is an Associate Editor for the Progress in Additive Manufacturing. He is a Research and Technology Associate at the Functional Polymer Research Unit at the Luxembourg Institute of Science and Technology (LIST). Additive Manufacturing in LIST is used in all research areas, primarily to produce prototypes for new

✉ Joamin Gonzalez-Gutierrez
joamin.gonzalez-gutierrez@list.lu

¹ Functional Polymers Research Unit, Materials Research and Technology Department, Luxembourg Institute of Science and Technology (LIST), L-4940 Hautcharage, Luxembourg

devices and tools. New feedstock materials for AM are also developed at the Materials Research and Technology Department, such as bio-based vitrimers, upcycled thermoplastics, high-performance biocomposites and functional composites.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.