Special Issue: 3D Printing of Metals

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Additive manufacturing (AM) has emerged as one of the most enabling new manufacturing technique; the topic has been extensively researched worldwide for almost two decades. The unique capabilities and potential of various AM techniques have led to almost homogeneous worldwide research efforts irrespective of international boundaries; such efforts have aimed at developing a thorough and critical understanding to harness the capabilities of AM that may translate to industrial practice. The motive behind these extensive research activities was to:

a.   Optimize the use of materials to reduce wastage [1].
b.   Optimize the use of manpower to enhance efficiency [1].
c.   Optimize the use of resources to limit production time [2].

Both global governments and the private sector have invested billions of dollars to develop AM techniques to realize the goal of enabling sustainability as well as a profitable manufacturing route. All three categories of materials (metals/alloys, polymers, and ceramics) have been researched and practically all applications, whether in engineering or related to biomedical fields, have been equally targeted.

To further this cause, a Special Issue was launched in the MDPI journal 'Applied Sciences', which sought original contributions to develop further understanding of this fascinating area of manufacturing. A total of nine articles were accepted after a rigorous peer review process and subsequently published. Overall, the papers addressed:

a.   AM process control/optimization including aspects of online monitoring [1,3,4]
b.   Comparison studies with existing manufacturing methods to validate the acceptability of AM [5]
c.   Product design and development [6]
d.   Properties improvement using AM techniques [7]

Many AM techniques have been developed over last two decades; the work done thus far has enabled current researchers to understand both the scientific and technical capabilities and the limitations of these techniques. Accordingly, researchers have been clear in their selection of AM techniques, choices which have been primarily governed by material and end applications.

The articles collected in the present Special Issue indicate an emphasis on:

a.   Metal-based materials including stainless steels, magnesium alloys, and nickel-based alloys [4,5,7].
b.   Polymer-based materials [8,9].

The industrial sectors which are likely to benefit from the studies presented in this Special Issue include but not limited to the following sectors:

a.   Construction
b.   Transportation, including automobile and aerospace sectors
c.   Nuclear

d.   Biomedical

e.   Manufacturing

Articles presented in this issue are expected to be of considerable interest to students and researchers working in a wide spectrum of engineering and biomedical fields as well as for a number of existing and new applications.

Finally, I would like to thank all the authors for their excellent contributions to this Issue, to the reviewers for making useful comments to improve the quality of each article, and to the Applied Sciences editorial staff for processing and publishing these articles at their earliest convenience.

References

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