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Advanced Characterization and On-Line Process Monitoring of Additively Manufactured Materials and Components

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Message from the Guest Editors

Additive manufacturing (AM) techniques have risen to prominence in many industrial sectors. This rapid success of AM is due to the freeform design, which offers enormous possibilities to the engineer, and to the reduction of waste material. Even safety-critical parts are now being produced using AM. This enthusiastic penetration of AM in our daily life is not yet paralleled by a thorough characterization and understanding of the microstructure of materials and of the internal stresses of parts. The same holds true for the understanding of the formation of defects during manufacturing. While simulation efforts are sprouting and some experimental techniques for on-line monitoring are available, still little is known about the propagation of defects throughout the life of a component (from powder to operando conditions).

This Issue aims to collect contributions about the advanced characterization of AM materials and components (especially at large-scale experimental facilities such as Synchrotron and Neutron sources), as well as efforts to liaise online process monitoring to the final product and even to the component during operation.

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Message from the Editor-in-Chief

Metallic materials play a vital role in the economic life of modern societies; contributions are sought on fresh developments that enhance our understanding of the fundamental aspects related to the relationships between processing, properties and microstructure – disciplines in the metallurgical field ranging from processing, mechanical behavior, phase transitions and microstructural evolution, nanostructures, as well as unique metallic properties – inspire general and scholarly interest among the scientific community.

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