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Recent Advances in Additive Manufacturing and Welding Technologies of Metals: Alloys, Simulation and Monitoring

Guest Editors:

Dr. Javier Vivas
LORTEK Technological Centre,
Basque Research and
Technology Alliance (BRTA),
Arranomendia Kalea 4A, 20240
Ordizia, Spain

Dr. Adriana Eres-Castellanos
Colorado School of Mines,
Golden, CO, USA

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Message from the Guest Editors

Additive manufacturing and advanced welding technologies have received a great deal of academic and industrial interest. One of the most important characteristics of these two technologies is their capability of manufacturing components with high geometrical complexity. However, the characterization of the resultant microstructures is complex, as the structure is the outcome of a rapid cooling process, which affects both solidification and phase transformation, and where the cooling rates usually lie in the range 10^2 – 10^6 K/s.

To better understand microstructure evolution, several approaches can be followed. First, the effect of parameters such as chemical composition or process-related parameters, as well as the physical processes involved, can be studied experimentally by ex situ characterization. Such characterization can be complemented by two different types of studies, that is, simulations (e.g., computational fluid dynamics) and in situ monitoring. Both types of studies can help to obtain information such as temperature distribution or defect characteristics as a function of time, which is why they are highly needed [...]





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Editors-in-Chief

Prof. Dr. Maryam Tabrizian

1. Department of Biomedical Engineering, Faculty of Medicine and Health Sciences, McGill University, Montreal, QC H3A 2B6, Canada

2. Faculty of Dentistry and Oral Health Sciences, McGill University, 3640 Rue University, Montreal, QC H3A 0C7, Canada

Prof. Dr. Yuguang Ma

State Key Laboratory of Luminescent Materials and Devices, South China University of Technology, Guangzhou 510640, China

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Contact Us

Materials Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland

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