



## Metal Additive Manufacturing (AM) for the Synthesis of Metastable Materials

Guest Editor:

**Dr. Konrad Kosiba**

Leibniz-Institut für Festkörper-  
und Werkstofforschung Dresden,  
Dresden, Germany

Deadline for manuscript  
submissions:

**closed (20 September 2023)**

### Message from the Guest Editor

Dear Colleagues,

Additive manufacturing (AM) enables the fabrication of complex, near-net shape components with high geometric freedom because of the layer-by-layer build-up. Metal AM technologies have found their way into industry, and are still attracting growing research interest. Key challenges remain with controlling the metal AM processes characterized by extremely high cooling rates ( $>10^4$  K/s) and directional heat extraction via underlying material which then experiences a repetitive heat treatment. Thus, the evolution of metastable microstructures is kinetically favored. Crystalline phases form during metal AM processing although they are not thermodynamically stable, while the formation of stable crystalline phases can be suppressed. In the most extreme case, the supercooled liquid does not crystallize and instead vitrifies, resulting in the synthesis of metallic glass. Crystal growth is strongly affected by the diverse processing conditions and complex thermal cycles, resulting in peculiar microstructural features and defects that influence the mechanical properties of the resulting component.





an Open Access Journal by MDPI

## Editor-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

## Message from the Editor-in-Chief

*Materials* (ISSN 1996-1944) was launched in 2008. The journal covers twenty-five comprehensive topics: biomaterials, energy materials, advanced composites, advanced materials characterization, porous materials, manufacturing processes and systems, advanced nanomaterials and nanotechnology, smart materials, thin films and interfaces, catalytic materials, carbon materials, materials chemistry, materials physics, optics and photonics, corrosion, construction and building materials, materials simulation and design, electronic materials, advanced and functional ceramics and glasses, metals and alloys, soft matter, polymeric materials, quantum materials, mechanics of materials, green materials, general. *Materials* provides a unique opportunity to contribute high quality articles and to take advantage of its large readership.

## Author Benefits

**Open Access:** free for readers, with article processing charges (APC) paid by authors or their institutions.

**High Visibility:** indexed within Scopus, SCIE (Web of Science), PubMed, PMC, Ei Compendex, CaPlus / SciFinder, Inspec, Astrophysics Data System, and other databases.

**Journal Rank:** JCR - Q2 (Metallurgy and Metallurgical Engineering) / CiteScore - Q1 (Condensed Matter Physics)

## Contact Us

Materials Editorial Office  
MDPI, Grosspeteranlage 5  
4052 Basel, Switzerland

Tel: +41 61 683 77 34  
[www.mdpi.com](http://www.mdpi.com)

[mdpi.com/journal/materials](http://mdpi.com/journal/materials)  
[materials@mdpi.com](mailto:materials@mdpi.com)  
[X@Materials\\_Mdpi](https://twitter.com/Materials_Mdpi)