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Physics-Based and Data-Driven Modelling of Process-Structure-Property (PSP) Linkage of Structural Metals

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Message from the Guest Editors

Dear Colleagues,

Metal forming/processing involves a series of thermo-mechanical deformations. Hierarchical structured materials develop during processing, which determines the final metal's properties. An efficient approach to accelerate material development is to establish the Process–Structure–Property (PSP) linkages. This is beneficial to forward property prediction, which also enables finding optimal architected structures for given target properties in inverse material design. In addition, it accelerates the design, characterisation, evaluation, and deployment of metals.

Physics-based modelling has become an effective and efficient tool in material development due to increased computational resources, improved numerical algorithms, and progressed physical models. The application of machine learning and big data in materials science is unveiling hidden PSP relationships and can be harnessed in inverse design, e.g., optimizing processing and discovering materials.

This Special Issue aims to cover the latest advances in establishing PSP linkages using physics-based computational material science and machine learning methods.

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Message from the Editorial Board

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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