Special Issue

Multi-Scale Modeling and Engineering Applications in Metal Additive Manufacturing and Powder Metallurgy

Message from the Guest Editors

This Special Issue explores how integrated computational strategies are moving beyond theory to solve real-world challenges. While Metal Additive Manufacturing (AM) and Powder Metallurgy (PM) offer unparalleled design freedom, their “multi-physics” nature—involving complex fluid dynamics, rapid solidification, and phase transformations—requires robust modeling to ensure reliability. We invite contributions that demonstrate how multi-scale simulations, from Discrete Element Method (DEM) and Computational Fluid Dynamics (CFD) to crystal plasticity and Finite Element Analysis (FEA), are applied to optimize outcomes. The goal is to bridge the gap between materials science and macroscopic performance. We welcome research focused on Integrated Computational Materials Engineering (ICME), digital twins, and machine learning-assisted design to predict defects, manage residual stresses, and enhance the structural integrity of components. By connecting physics-based models with experimental validation and “intelligent production systems”, this issue aims to accelerate the transition toward simulation-driven manufacturing and sustainable engineering.

Guest Editors

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Message from the Editor-in-Chief

As the world of science becomes ever more specialized, researchers may lose themselves in the deep forest of the ever increasing number of subfields being created. This open access journal *Applied Sciences* has been started to link these subfields, so researchers can cut through the forest and see the surrounding, or quite distant fields and subfields to help develop his/her own research even further with the aid of this multi-dimensional network.

Editor-in-Chief

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