Special Issue

Recent Advances in Fatigue and Corrosion Properties of Steels

Message from the Guest Editor

The study of fatigue and corrosion behavior in steels remains a critical area of research, driven by the growing demand for high-performance materials in extreme environments. Innovative approaches in material design, including microstructural optimization through advanced thermo-mechanical processing and alloying, have significantly enhanced fatigue resistance and corrosion durability. Furthermore, cutting-edge characterization techniques, have provided deeper insights into crack initiation and propagation mechanisms under combined fatigue–corrosion conditions. The integration of computational modeling, including finite element analysis (FEA) and machine learning algorithms, has enabled more accurate predictions of service life and failure modes. Additionally, novel surface engineering methods, such as laser cladding and nanocoatings, offer promising solutions for mitigating corrosion-induced fatigue damage. This Special Issue aims to highlight breakthroughs in understanding and improving the fatigue and corrosion performance of steels, emphasizing interdisciplinary approaches that bridge materials science, mechanics, and environmental engineering.

Guest Editor

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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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