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Precipitating Strengthening, Heat Treatment and Deep Cryogenic Treatment of Steel

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Message from the Guest Editors

Dear Colleagues,

Precipitation strengthening is one of several mechanisms leading to higher strength in metals. This powerful phase transformation is used in steels to control their properties. Precipitation strengthening is normally induced by heat treatment where diverse thermal processes can be applied. The chapter on heat treatment deals with deep cryogenic treatment, which benefits mainly steel materials after quenching and tempering. Refinement of the kinetic description of precipitation, identification of effects of microstructural features, and environmental impacts on precipitation kinetics, the effect of precipitate morphology on the activation energy of defect nucleation, and confirmation of theories of structural changes during deep cryogenic treatment are just a handful of themes to be addressed.

In this Special Issue, we aim to contribute to the entire theory of precipitation in steels to advance the knowledge of heat treatment and deep cryogenic treatment processes. The comprehensive view of the relationships among the treatment process, characterization of fine microstructure, and the final properties of the workpiece should provide another piece in the puzzle.

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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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