



Phase Transformations in Steels: Fundamentals and Diffusion-Controlled Transformations (Woodhead Publishing Series in Metals and Surface Engineering)

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The processing-microstructure-property relationships in steels continue to present challenges to researchers because of the complexity of phase transformation reactions and the wide spectrum of microstructures and properties achievable. This major two-volume work summarises the current state of research on phase transformations in steels and its implications for the emergence of new steels with enhanced engineering properties.

Volume 1 reviews fundamentals and diffusion-controlled phase transformations. After a historical overview, chapters in part one discuss fundamental principles of thermodynamics, diffusion and kinetics as well as phase boundary interfaces. Chapters in part two go on to consider ferrite formation, proeutectoid ferrite and cementite transformations, pearlite formation and massive austenite-ferrite phase transformations. Part three discusses the mechanisms of bainite transformations, including carbide-containing and carbide-free bainite. The final part of the book considers additional driving forces for transformation including nucleation and growth during austenite-to-ferrite phase transformations, dynamic strain-induced ferrite transformations (DIST) as well as the effects of magnetic fields and heating rates.

With its distinguished editors and distinguished international team of contributors, the two volumes of Phase transformations in steels is a standard reference for all those researching the properties of steel and developing new steels in such areas as automotive engineering, oil and gas and energy production.

- Discusses the fundamental principles of thermodynamics, diffusion and kinetics
- Considers various transformations, including ferrite formation, proeutectoid ferrite and cementite transformations
- Considers additional driving forces for transformation including nucleation and growth during austenite-to-ferrite phase transformations

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