

1. Record Nr.	UNINA9910726275403321
Autore	Nagumo Michihiko
Titolo	Fundamentals of Hydrogen Embrittlement / / by Michihiko Nagumo
Pubbl/distr/stampa	Singapore : , : Springer Nature Singapore : , : Imprint : Springer, , 2023
ISBN	9789819909926 9789819909919
Edizione	[2nd ed. 2023.]
Descrizione fisica	1 online resource (316 pages)
Collana	Chemistry and Materials Science Series
Disciplina	620.1623
Soggetti	Metals Building materials Materials - Analysis Materials Catalysis Force and energy Mechanics, Applied Solids Metals and Alloys Steel, Light Metal Materials Characterization Technique Materials for Energy and Catalysis Solid Mechanics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	1. Solid Solution -- 2. Hydrogen Trapping and Its Direct Detection -- 3. Interactions of Hydrogen with Lattice Defects -- 4. Diffusion and Transport of Hydrogen -- 5. Deformation Behaviors -- 6. Macroscopic Manifestation of Hydrogen Embrittlement -- 7. Microscopic Features Characterizing Hydrogen Embrittlement -- 8. Effects and Intrinsic functions of Microstructures -- 9. Mechanistic Aspects of Fracture I ~ Brittle Fracture Models -- 10. Mechanistic Aspects of Fracture II ~ Plasticity-Dominated Fracture Models -- 11. Delayed Fracture in atmospheric Environments. .

This book is the second edition of the one originally published in 2016, as the first comprehensive treatment on the fundamentals of hydrogen embrittlement of metallic materials, mainly steel. The book provides students and researchers engaging in hydrogen problems with a unified view of the subject. Establishing reliable principles for materials design against hydrogen embrittlement and assessing their performance are recent urgent industrial needs in developing high-strength steel for hydrogen energy equipment and weight-reducing vehicles. The interdisciplinary nature of the subject, covering metal physics, materials science, and mechanics of fracture, has disturbed a profound understanding of the problem. In this book, previous studies are critically reviewed, and supplemental descriptions of fundamental ideas are presented when necessary. Emphasis is placed on experimental facts, with particular attention to their implication rather than phenomenological appearance. The adopted experimental conditions are also noted since the operating mechanism of hydrogen might differ by material and environment. For theories, employed assumptions and premises are noted to examine their versatility. Progress in the past decade in experimental and theoretical tools is remarkable and has nearly unveiled characteristic features of hydrogen embrittlement. Proposed models have almost covered feasible aspects of the function of hydrogen. This second edition has enriched the contents with recent crucial findings. Chapters on the manifestation of embrittlement in the deterioration of mechanical properties and microscopic features are reorganized, and the description is revised for the convenience of readers' systematic understanding. A new chapter is created for delayed fracture in atmospheric environments as a conclusive subject of critical ideas presented in this book.

---