

1. Record Nr.	UNINA9910453129703321
Autore	Smallman R. E
Titolo	Modern physical metallurgy // R.E. Smallman, A.H.W. Ngan
Pubbl/distr/stampa	Oxford, UK : , : Butterworth-Heinemann, , [2014] ©2014
ISBN	0-08-098223-9
Edizione	[Eighth edition.]
Descrizione fisica	1 online resource (720 p.)
Altri autori (Persone)	NganA. H. W
Disciplina	669/.94
Soggetti	Physical metallurgy Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Front Cover; Modern Physical Metallurgy; Copyright Page; Contents; Preface; Acknowledgement; About the authors; 1 Atoms and Atomic Arrangements; 1.1 The free atom; 1.1.1 Discrete electron states; 1.1.2 Nomenclature for the electronic states; 1.2 The periodic table; 1.3 Interatomic bonding in materials; 1.4 Bonding and energy levels; 1.5 Crystal lattices and structures; 1.6 Crystal directions and planes; 1.7 Stereographic projection; 1.8 Selected crystal structures; 1.8.1 Pure metals; 1.8.2 Diamond and graphite; 1.8.3 Coordination in ionic compounds; 1.8.4 AB-type compounds 1.9 Imperfections in crystals Further reading; 2 Phase Diagrams and Alloy Theory; 2.1 Introduction; 2.2 The concept of a phase; 2.3 The Phase Rule; 2.4 Stability of phases; 2.4.1 The concept of free energy; 2.4.2 Free energy and temperature; 2.4.3 Free energy and composition; 2.5 The mechanism of phase changes; 2.5.1 Kinetic considerations; 2.5.2 Nucleation in solids; 2.6 Two-phase equilibria; 2.7 Three-phase equilibria and reactions; 2.7.1 The eutectic reaction; 2.7.2 The peritectic reaction; 2.7.3 Classification of three-phase equilibria; 2.8 Intermediate phases 2.9 Limitations of phase diagrams 2.10 Some key phase diagrams; 2.10.1 Copper-zinc system; 2.10.2 Iron-carbon system; 2.10.3 Copper-lead system; 2.11 Ternary phase diagrams; 2.11.1 Ternary diagrams for complete solid miscibility; 2.11.2 Ternary eutectic; 2.11.3 Ternary diagrams with solid solutions; 2.11.4 Ternary diagrams with a

peritectic; 2.11.5 Ternary diagrams containing intermetallic phases; 2.12 Principles of alloy theory; 2.12.1 Primary substitutional solid solutions; 2.12.1.1 The Hume-Rothery rules; 2.12.1.2 Size-factor effect; 2.12.1.3 Electrochemical effect  
2.12.1.4 Relative valency effect 2.12.1.5 The primary solid solubility boundary; 2.12.2 Interstitial solid solutions; 2.12.3 Types of intermediate phases; 2.12.3.1 Electrochemical compounds; 2.12.3.2 Size-factor compounds; 2.12.3.3 Electron compounds; 2.12.4 Order-disorder phenomena; Further reading; 3 Solidification; 3.1 Crystallization from the melt; 3.1.1 Freezing of a pure metal; 3.1.2 Homogeneous nucleation; 3.1.3 Heterogeneous nucleation; 3.2 Continuous growth; 3.3 Lateral growth; 3.4 Dendritic growth; 3.4.1 Plane-front and dendritic solidification at a cooled surface  
3.4.2 Length of dendrite cores 3.5 Forms of cast structure; 3.6 Gas porosity; 3.7 Segregation; 3.8 Directional solidification; 3.9 Production of metallic single crystals for research; 3.10 Coring; 3.11 Cellular microsegregation; 3.12 Zone refining; 3.13 Eutectic solidification; 3.14 Continuous casting; 3.15 Fusion welding; 3.16 Metallic glasses; 3.17 Rapid solidification processing; Further reading; 4 Introduction to Dislocations; 4.1 Concept of a dislocation; 4.1.1 Edge and screw dislocations; 4.1.2 The Burgers vector; 4.1.3 Mechanisms of slip and climb  
4.2 Strain energy associated with dislocations

---

## Sommario/riassunto

Modern Physical Metallurgy describes, in a very readable form, the fundamental principles of physical metallurgy and the basic techniques for assessing microstructure. This book enables you to understand the properties and applications of metals and alloys at a deeper level than that provided in an introductory materials course. The eighth edition of this classic text has been updated to provide a balanced coverage of properties, characterization, phase transformations, crystal structure, and corrosion not available in other texts, and includes updated illustrations along with

---