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Primary substitutional solid solutions; 2.3.2 Interstitial solid solutions; 2.3.3 Types of intermediate phases; 2.3.4 Order-disorder phenomena; 2.4 The mechanism of phase changes; 2.4.1 Kinetic considerations; 2.4.2 Homogeneous nucleation; 2.4.3 Heterogeneous nucleation; 2.4.4 Nucleation in solids; Chapter 3 Crystal defects; 3.1 Types of imperfection; 3.2 Point defects
3.2.1 Point defects in metals3.2.2 Point defects in non-metallic crystals; 3.2.3 Irradiation of solids; 3.2.4 Point defect concentration and annealing; 3.3 Line defects; 3.3.1 Concept of a dislocation; 3.3.2 Edge and screw dislocations; 3.3.3 The Burgers vector; 3.3.4 Mechanisms of slip and climb; 3.3.5 Strain energy associated with dislocations; 3.3.6 Dislocations in ionic structures; 3.4 Planar defects; 3.4.1 Grain boundaries; 3.4.2 Twin boundaries; 3.4.3 Extended dislocations and stacking faults in close-packed crystals; 3.5 Volume defects; 3.5.1 Void formation and annealing
3.5.2 Irradiation and voiding3.5.3 Voiding and fracture; 3.6 Defect behavior in common crystal structures; 3.6.1 Dislocation vector diagrams and the Thompson tetrahedron; 3.6.2 Dislocations and stacking faults in fcc structures; 3.6.3 Dislocations and stacking faults in cph structures; 3.6.4 Dislocations and stacking faults in bcc structures; 3.6.5 Dislocations and stacking faults in ordered structures; 3.7 Stability of defects; 3.7.1 Dislocation loops; 3.7.2 Voids; 3.7.3 Nuclear irradiation effects; Chapter 4 Characterization and analysis; 4.1 Tools of characterization; 4.2 Light microscopy
4.2.1 Basic principles

Sommario/riassunto

"Physical Metallurgy and Advanced Materials " is the latest edition of the classic book previously published as "Modern Physical Metallurgy & Materials Engineering." Fully revised and expanded, this new edition develops on its predecessor by including detailed coverage of the latest topics in metallurgy and material science. Intended for senior undergraduates and graduate students it emphasises the science, production and applications of engineering materials, and is suitable for all post-introductory materials science courses. "Key Features: " * Renowned coverage of metals and alloys, plus other materials classes including ceramics and polymers. *Updated coverage of sports materials, biomaterials and nanomaterials. *Covers new materials characterization techniques, including scanning tunneling microscopy (STM), atomic force microscopy (AFM), and nanoindentation. *Easy to navigate with contents split into logical groupings: fundamentals, metals and alloys, nonmetals, processing and applications. *Detailed worked examples with real-world applications. *Rich pedagogy includes extensive homework exercises, lecture slides and full online solutions manual (coming).

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