1. Record Nr. UNINA9910143558503321

Autore	Maier Joachim
Titolo	Physical chemistry of ionic materials [[electronic resource]] : ions and electrons in solids / / Joachim Maier
Pubbl/distr/stampa	Chichester ; ; Hoboken, NJ, : Wiley, c2004
ISBN	9786610274871 0-470-02022-9 1-280-27487-5 0-470-02021-0
Descrizione fisica	1 online resource (539 p.)
Disciplina	541.0421 541.3723
Soggetti	Solids - Electric properties Solid state chemistry Solids - Defects 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 (p. [500]-526) and index.
Nota di contenuto	Contents; 1 Introduction; 1.1 Motivation; 1.2 The defect concept: Point defects as the main actors; 2 Bonding aspects: From atoms to solid state; 2.1 Chemical bonding in simple molecules; 2.1.1 Ideal covalent bonding; 2.1.2 Polar covalent bonding; 2.1.3 The ionic bonding; 2.1.4 Metallic bonding; 2.1.5 Further intermediate forms of chemical bonding; 2.1.6 Two-body potential functions; 2.2 Many atoms in contact: The solid state as a giant molecule; 2.2.1 The band model; 2.2.2 Ionic crystals; 2.2.3 Molecular crystals; 2.2.4 Covalent crystals; 2.2.5 Metallic crystals 2.2.6 Mixed forms of bonding in solids 2.2.7 Crystal structure and solid state structure; 3 Phonons; 3.1 Einstein and Debye models; 3.2 Complications; 4 Equilibrium thermodynamics of the perfect solid; 4.1 Preliminary remarks; 4.2 The formalism of equilibrium thermodynamics; 4.3 Examples of equilibrium thermodynamics; 4.3.1 Solid-solid phase transition; 4.3.2 Melting and evaporation; 4.3.3 Solid-solid reaction; 4.3.4 Solid-gas reaction; 4.3.5 Phase equilibria

and mixing reactions; 4.3.6 Spatial equilibria in inhomogeneous systems; 4.3.7 Thermodynamics of elastically deformed solids
4.3.8 The thermodynamic functions of state of the perfect solid 5 Equilibrium thermodynamics of the real solid; 5.1 Preliminary remarks; 5.2 Equilibrium thermodynamics of point defect formation; 5.3 Equilibrium thermodynamics of electronic defects; 5.4 Higher-dimensional defects; 5.4.1 Equilibrium concentration; 5.4.2 Dislocations: Structure and energetics; 5.4.3 Interfaces: Structure and energetics; 5.4.4 Interfacial thermodynamics and local mechanical equilibria; 5.5 Point defect reactions; 5.5.1 Simple internal defect equilibria; 5.5.2 External defect equilibria; 5.6 Doping effects
5.7 Interactions between defects 5.7.1 Associates; 5.7.2 Activity coefficients; 5.8 Boundary layers and size effects; 5.8.1 General; 5.8.2 Concentration profiles in the space charge zones; 5.8.3 Conductivity effects; 5.8.4 Defect thermodynamics of the interface; 5.8.5 Examples and supplementary comments; 6 Kinetics and irreversible thermodynamics; 6.1 Transport and reaction; 6.1.1 Transport and reaction in the light of irreversible thermodynamics; 6.1.2 Transport and reaction in the light of chemical kinetics; 6.2 Electrical mobility; 6.2.1 Ion mobility; 6.2.2 Electron mobility
6.3 Phenomenological diffusion coefficients 6.3.1 Ion conduction and self-diffusion; 6.3.2 Tracer diffusion; 6.3.3 Chemical diffusion; 6.3.4 A comparison of the phenomenological diffusion coefficients; 6.4 Concentration profiles; 6.5 Diffusion kinetics of stoichiometry change; 6.6 Complications of matter transport; 6.6.1 Internal interactions; 6.6.2 Boundary layers and grain boundaries; 6.7 Surface reactions; 6.7.1 Elementary processes; 6.7.2 Coupled reactions; 6.7.3 Phenomenological rate constants; 6.7.4 Reactivity, chemical resistance and chemical capacitance; 6.8 Catalysis
6.9 Solid state reactions

Sommario/riassunto

Defects play an important role in determining the properties of solids. This book provides an introduction to chemical bond, phonons, and thermodynamics; treatment of point defect formation and reaction, equilibria, mechanisms, and kinetics; kinetics chapters on solid state processes; and electrochemical techniques and applications.Offers a coherent description of fundamental defect chemistry and the most common applications.Up-to-date trends and developments within this field.Combines electrochemical concepts with aspects of semiconductor physics.