1. Record Nr. UNINA9910877503703321

Autore	Tilley R. J. D
Titolo	Defects in solids [[electronic resource] /] / Richard J.D. Tilley
Pubbl/distr/stampa	Hoboken, N.J., : Wiley, c2008
ISBN	1-283-20329-4 9786613203298 0-470-38075-6 0-470-38073-X
Descrizione fisica	1 online resource (549 p.)
Collana	Special Topics in Inorganic Chemistry ; ; v.4
Disciplina	620.1/1 620.11
Soggetti	Solids - Defects Solids - Electric properties Solids - Magnetic properties Solids - Optical properties
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 indexes.
Nota di contenuto	DEFECTS IN SOLIDS; CONTENTS; Preface; 1. Point Defects; 1.1 Introduction; 1.2 Point and Electronic Defects in Crystalline Solids; 1.3 Electronic Properties: Doped Silicon and Germanium as Examples; 1.4 Optical Properties: F Centers and Ruby as Examples; 1.5 Bulk Properties; 1.5.1 Unit Cell Dimensions; 1.5.2 Density; 1.5.3 Volume; 1.5.4 Young's Modulus (the Elastic Modulus); 1.6 Thermoelectric Properties: The Seebeck Coefficient as an Example; 1.7 Point Defect Notation; 1.8 Charges on Defects; 1.8.1 Electrons and Electron Holes; 1.8.2 Atomic and Ionic Defects 1.9 Balanced Populations of Point Defects: Schottky and Frenkel Defects 1.9.1 Schottky Defects; 1.9.2 Frenkel Defects; 1.10 Antisite Defects; 1.11 Defect Formation and Reaction Equations; 1.11.1 Addition and Subtraction of Atoms; 1.11.2 Equation Formalism; 1.11.3 Formation of Antisite Defects; 1.11.4 Nickel Oxide; 1.11.5 Cadmium Oxide; 1.11.6 Calcia-stabilized Zirconia; 1.11.7 Ternary Oxides; 1.12 Combinations of Point Defects in Pure Materials; 1.13 Structural Consequences of Point Defect Populations; 1.14 Answers to Introductory Questions;

Problems and Exercises; References; Further Reading

2. Intrinsic Point Defects in Stoichiometric Compounds 2.1 Equilibrium Population of Vacancies in a Monatomic Crystal; 2.2 Equilibrium Population of Self-Interstitials in a Monatomic Crystal; 2.3 Equilibrium Population of Schottky Defects in a Crystal; 2.4 Lithium Iodide Battery; 2.5 Equilibrium Population of Frenkel Defects in a Crystal; 2.6 Photographic Film; 2.7 Photochromic Glasses; 2.8 Equilibrium Population of Antisite Defects in a Crystal; 2.9 Intrinsic Defects: Trends and Further Considerations; 2.10 Computation of Defect Energies; 2.10.1 Defect Calculations
2.10.2 Point Defect Interactions 2.10.3 Atomistic Simulation; 2.10.4 The Shell Model; 2.10.5 Defect Formation Energy; 2.10.6 Quantum Mechanical Calculations; 2.11 Answers to Introductory Questions; Problems and Exercises; References; Further Reading; 3. Extended Defects; 3.1 Dislocations; 3.2 Edge Dislocations; 3.3 Screw Dislocations; 3.4 Mixed Dislocations; 3.5 Unit and Partial Dislocations; 3.6 Multiplication of Dislocations; 3.7 Interaction of Dislocations and Point Defects; 3.7.1 Dislocation Loops; 3.7.2 Dislocation Climb; 3.7.3 Decoration of Dislocations
3.8 Dislocations in Nonmetallic Crystals 3.9 Internal Boundaries; 3.10 Low-Angle Grain Boundaries; 3.11 Twin Boundaries; 3.12 Antiphase Boundaries; 3.13 Domains and Ferroic Materials; 3.13.1 Magnetic Structures; 3.13.2 Ferroelectric Structures; 3.13.3 Ferroic Structures; 3.14 External Surfaces and Grain Boundaries; 3.14.1 Optical Characteristics of Polycrystalline Solids; 3.14.2 Electronic Properties of Interfaces; 3.14.3 Varistors; 3.14.4 Positive Temperature Coefficient Thermistors; 3.15 Volume Defects and Precipitates; 3.16 Answers to Introductory Questions; Problems and Exercises
Further Reading

Sommario/riassunto

Provides a thorough understanding of the chemistry and physics of defects, enabling the reader to manipulate them in the engineering of materials.Reinforces theoretical concepts by placing emphasis on real world processes and applications. Includes two kinds of end-of-chapter problems: multiple choice (to test knowledge of terms and principles) and more extensive exercises and calculations (to build skills and understanding).Supplementary material on crystallography and band structure are included in separate appendices.