1. Record Nr. UNISA996217139303316

Autore	Guinebretiere Rene
Titolo	X-ray diffraction by polycrystalline materials [[electronic resource] /] / Rene Guinebretiere
Pubbl/distr/stampa	London ; ; Newport Beach, CA, : ISTE, 2007
ISBN	1-280-84764-6 9786610847648 0-470-61240-1 0-470-39453-6 1-84704-571-5
Descrizione fisica	1 online resource (385 p.)
Collana	ISTE ; ; v.97
Disciplina	548.83 548/.83
Soggetti	X-rays - Diffraction Crystallography
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. [319]-347) and index.
Nota di contenuto	X-ray Diffraction by Polycrystalline Materials; Table of Contents; Preface; Acknowledgements; An Historical Introduction: The Discovery of X-rays and the First Studies in X-ray Diffraction; Part 1. Basic Theoretical Elements, Instrumentation and Classical Interpretations of the Results; Chapter 1. Kinematic and Geometric Theories of X-ray Diffraction; 1.1. Scattering by an atom; 1.1.1. Scattering by a free electron; 1.1.1.1. Coherent scattering: the Thomson formula; 1.1.1.2. Incoherent scattering: Compton scattering [COM 23]; 1.1.2. Scattering by a bound electron 1.1.3. Scattering by a multi-electron atom1.2. Diffraction by an ideal crystal; 1.2.1. A few elements of crystallography; 1.2.1.1. Direct lattice; 1.2.1.2. Reciprocal lattice; 1.2.2. Kinematic theory of diffraction; 1.2.2.1. Diffracted amplitude: structure factor and form factor; 1.2.2.2. Diffracted intensity; 1.2.2.3. Laue conditions [FRI 12]; 1.2.3. Geometric theory of diffraction; 1.2.3.1. Laue conditions; 1.2.3.2. Bragg's law [BRA 13b, BRA 15]; 1.2.3.3. The Ewald sphere; 1.3. Diffraction by an ideally imperfect crystal; 1.4. Diffraction by a polycrystalline sample

Chapter 2. Instrumentation used for X-ray Diffraction2.1. The different elements of a diffractometer; 2.1.1. X-ray sources; 2.1.1.1. Crookes tubes; 2.1.1.2. Coolidge tubes; 2.1.1.3. High intensity tubes; 2.1.1.4. Synchrotron radiation; 2.1.2. Filters and monochromator crystals; 2.1.2.1. Filters; 2.1.2.2. Monochromator crystals; 2.1.2.3. Multi-layered monochromators or mirrors; 2.1.3. Detectors; 2.1.3.1. Photographic film; 2.1.3.2. Gas detectors; 2.1.3.3. Solid detectors; 2.2. Diffractometers designed for the study of powdered or bulk polycrystalline samples
2.2.1. The Debye-Scherrer and Hull diffractometer2.2.1.1. The traditional Debye-Scherrer and Hull diffractometer; 2.2.1.2. The modern Debye-Scherrer and Hill diffractometer: use of position sensitive detectors; 2.2.2. Focusing diffractometers: Seeman and Bohlin diffractometers; 2.2.2.1. Principle; 2.2.2.2. The different configurations; 2.2.3. Bragg-Brentano diffractometers; 2.2.3.1. Principle; 2.2.3.2. Description of the diffractometer; path of the X-ray beams; 2.2.3.3. Depth and irradiated volume; 2.2.4. Parallel geometry diffractometers; 2.2.5. Diffractometers equipped with plane detectors 2.3. Diffractometers designed for the study of thin films2.3.1. Fundamental problem; 2.3.1.1. Introduction; 2.3.1.2. Penetration depth and diffracted intensity; 2.3.2. Conventional diffractometers designed for the study of polycrystalline films; 2.3.3. Systems designed for the study of textured layers; 2.3.4. High resolution diffractometers designed for the study of epitaxial films; 2.3.5. Sample holder; 2.4. An introduction to surface diffractometry; Chapter 3. Data Processing, Extracting Information; 3.1. Peak profile: instrumental aberrations; 3.1.1. X-ray source: g1(); 3.1.2. Slit: g2()
3.1.3. Spectral width: g3()

Sommario/riassunto

This book presents a physical approach to the diffraction phenomenon and its applications in materials science.An historical background to the discovery of X-ray diffraction is first outlined. Next, Part 1 gives a description of the physical phenomenon of X-ray diffraction on perfect and imperfect crystals. Part 2 then provides a detailed analysis of the instruments used for the characterization of powdered materials or thin films. The description of the processing of measured signals and their results is also covered, as are recent developments relating to quantitative microstructural ana