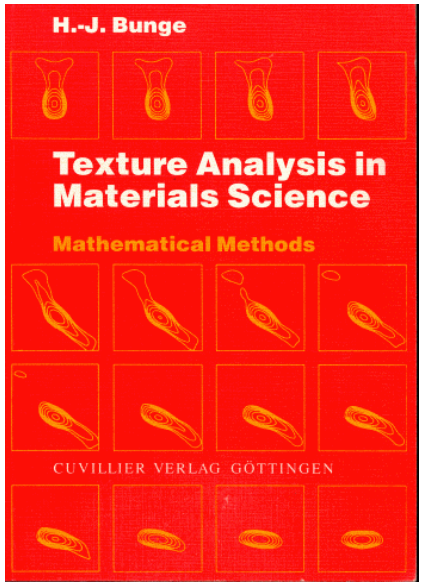


Texture Analysis in Materials Science
Mathematical Methods

H.-J. Bunge, Translated by Dr. Peter R. Morris
Butterworths, London Boston 1982.
Hardcover 593 pages ISBN 0408106425

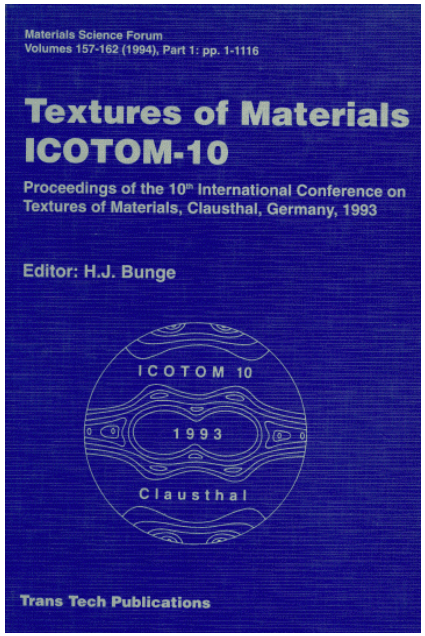
Reprint: Cuvillier-Verlag Göttingen, 1993
Softcover 593 pages ISBN 3-928815-81-4

In a polycrystalline material such as a metal or ceramic the orientations of the crystal axes in the different grains are often distributed randomly, so that the material as a whole behaves in an isotropic manner. In some cases, however, the individual grain orientations may be grouped closely around a mean value throughput or in parts of a processed material, and as a result anisotropy in mechanical and physical properties is developed. Such preferred orientations or textures are developed by the deformation and the recrystallization of materials, as in the production of wire or sheet in cubic metals, and are dependent on the type of deformation, the crystal structure and the presence of alloying additions in solution.

The development of texture, and thus anisotropy, may be maximized under control for such purposes as directional magnetic properties (as in 3 % silicon-iron for transformers) and for drawability (as in sheet low-carbon steel) where strength in the through-thickness direction should be high as compared to that in the plane of the sheet. It is clear, therefore, that the analysis and control of texture in fabricated polycrystalline materials is a very important scientific aspect of the fabrication technology. There are several ways of describing preferred orientation in a material, and modern computational facilities have made it possible to utilize crystallographic data with mathematical methods to improve the quantitative concepts and definition of the phenomenon in the orientation distribution function (ODF). Professor Bunge s work covers this area of texture data calculation and interpretation for a wide range of materials and affected properties.

Texture Analysis in Materials Science, which in its first edition was available only in German, has been revised thoroughly and updated for the English translation.

Contents:
Introduction • Orientation of Individual Crystallite • Orientation Distributions • Expansion of Orientation Distribution Functions • Fibre Textures • Methods not Based on the Series Expansion • Special Distribution Functions • Texture Transformation • A System of Programs for the Texture Analysis of Sheets of Cubic Materials • Estimation of the Errors • Some Results of Texture Analysis • Orientation Distribution Functions of Other Structural Elements • Physical Properties of Polycrystalline Materials • Mathematical Aids • Numerical Tables • Graphic Representations • References • Index • Appendixes

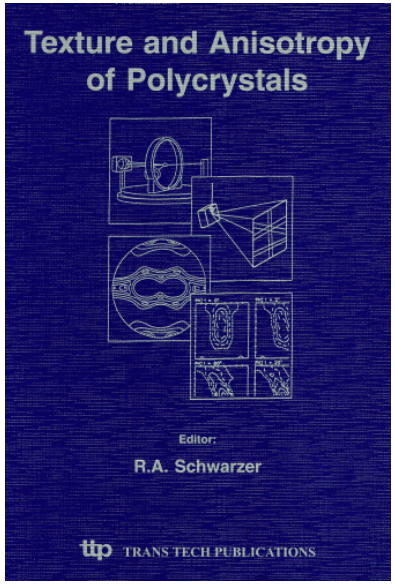


Textures of Materials - ICOTOM 10

Proceedings of the International Conference on Textures of Materials (ICOTOM-10), Clausthal, Germany, September 1993
Editor: H.J. Bunge

Published in: Materials Science Forum, Volumes 157 - 162, ttp 1994
Hardcover, 2-Volume Set Pages: 2168
ISBN-13: 978-0-87849-681-5

This book reflects quite clearly the expansion of the field of "textures" as well as the rapid growth of the texture community. During the recent years, the scope of this field has been expanded to virtually all crystalline and even partly crystalline materials including inter-metallic compounds, ceramics, polymers as well as multiphase composites and even fullerenes.



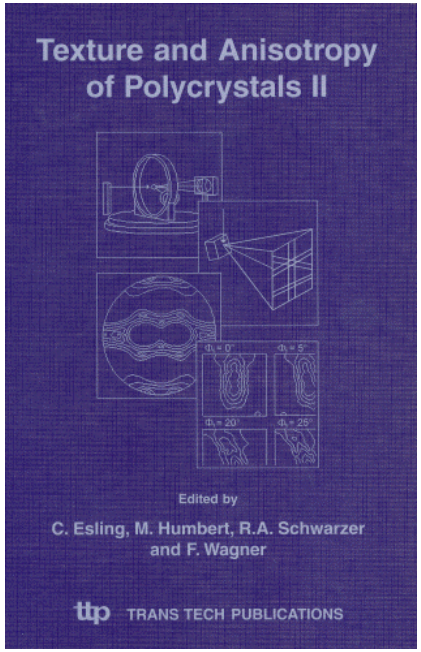
Texture and Anisotropy of Polycrstals
Proceedings of the International Conference on Texture and Anisotropy of Polycrystals (ITAP '97), Clausthal, Germany, September 1997
Editor: R.A. Schwarzer
Published in: Materials Science Forum, Volumes 273 - 275
Hardcover Pages: 736, ttp 1998

ISBN-13: 978-0-87849-802-4

Preferred crystal orientations and their statistical distribution – the polycrystalline 'texture' – are of major scientific interest and are of great importance in a wide range of industrial applications. The aim of this book is to monitor the rapid progress made in this field during the last few years.

Texture analysis has expanded beyond its traditional domain of cubic metals and alloys to encompass virtually all crystalline, and even partially crystalline, materials - including natural as well as man-made ones such as geological samples, minerals, ceramics, polymers, composites, low-symmetry materials, thin films and layers. The main objectives are to obtain a better understanding and control of the properties of anisotropic materials (as related to bulk, grain or grain boundary structures), recrystallization and grain growth, deformation textures, and correlations between internal stress, composition and texture.

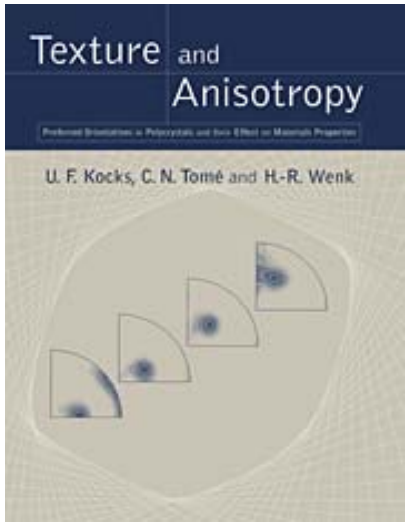
The 96 selected papers cover nearly every aspect of texture research and control and the volume therefore provides a timely survey of the current state of texture analysis. 1. Plenary Lectures of the Honorary Colloquium. 2. Theoretical Methods of Texture Analysis. 3. Advancements in Experimental Methods. 4. Local Textures and Deformation Banding. 5. Deformation Textures. 6. Recrystallization Textures. 7. Textures in Advanced Materials. 8. Textures in Non-Metals. 9. Properties Related to Texture. 10. Texture Analysis in Geology.



Texture and Anisotropy of Polycrystals II
Proceedings of the International Conference on Texture and Anisotropy of Polycrystals (ITAP 2) in Metz, 7-9 July 2004
Editors: C. Esling, M. Humbert, R.A. Schwarzer and F. Wagner
Published in: Solid State Phenomena, Volume 105 (2005)
Softcover Pages: 486 ttp 2005
ISBN-13: 978-3-908451-09-9

Natural, as well as man-made, materials are often assumed to behave uniformly, exhibiting equal strength in all directions, because most of them have a polycrystalline structure. The anisotropy of the individual crystals, however, is smoothed out only in the presence of a large number of grains having a random distribution of orientations. In reality, there usually remains an anisotropy due to the existence of preferred orientations. Its magnitude depends upon the statistical distribution of grain orientations – the "crystallographic texture" or, more simply, the texture. –This governs the extremes, of the physical property of interest, which a single crystal of the material under consideration can exhibit in directional tests. Local variations in texture, as well as the arrangements and types of grain/phase boundaries, may give rise to inhomogeneous material properties. The texture also carries with it information on the history of a material's processing, use and misuse. A knowledge of the texture is a prerequisite for all quantitative techniques of materials characterization, and is based upon the interpretation of diffraction-peak intensities. It is also necessary to model the relationships between microstructural features and physical or mechanical properties. Therefore, the texture is of great value for quality control in a wide range of industrial applications, and in basic materials research.

Notable advances in experimental and theoretical methods of texture analysis, and in its use for understanding or predicting materials' behavior have been made recently. It is the aim of this collection to provide a timely survey of the state of the art of texture analysis, as exemplified by some typical applications. This 480-page volume comprises 74 papers which cover almost all aspects of texture research and will serve as a useful guide to this challenging field.



Texture and Anisotropy

Preferred Orientations in Polycrystals and their Effect on Materials Properties

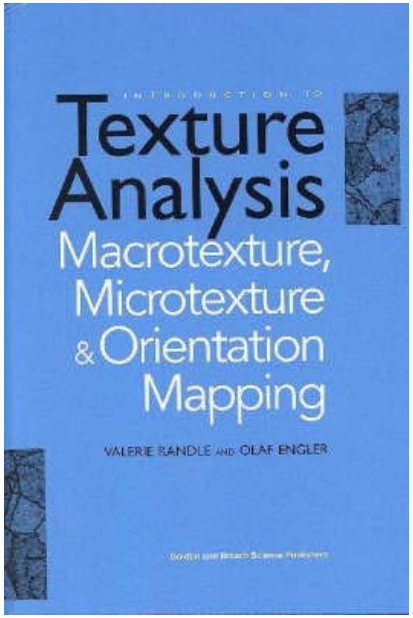
U. F. Kocks, C. N. Tomé and H. -R. Wenk
Cambridge University Press 2000
Paperback Pages: 675 List Price: $ 84.00
ISBN-13: 978-0521794206

There was also a Hardback of this title in 1998, but it is no longer available.

Many man-made materials and naturally occurring substances are aggregates of crystals, or polycrystals, with a non-random distribution of orientations. In such textured polycrystals, many macroscopic physical properties are anisotropic, i.e. they depend on direction.

This book is about the measurement and analysis of textures, the prediction of polycrystal properties from measured textures and known single crystal properties, and the prediction of the development of texture and the ensuing anisotropic properties during elastic and plastic deformation. It also gives an overview of observed textures in metals, ceramics and rocks. There is a balance between theoretical concepts and experimental techniques. The book addresses several issues. Part I provides tools and describes methods to obtain quantitative data on textures of polycrystals. It should be of interest to experimentalists. Part II emphasizes modeling of deformation and incorporates theoretical concepts of mechanics. Part III illustrates successful applications in engineering and earth sciences.

Contents



Introduction to Texture Analysis: Macrotexture, Microtexture and Orientation Mapping

Valerie Randle and Olaf Engler

388 pages £85.00
Crc Pr Inc Taylor & Francis London, 2000

ISBN-13: 978-9056992248

Synopsis

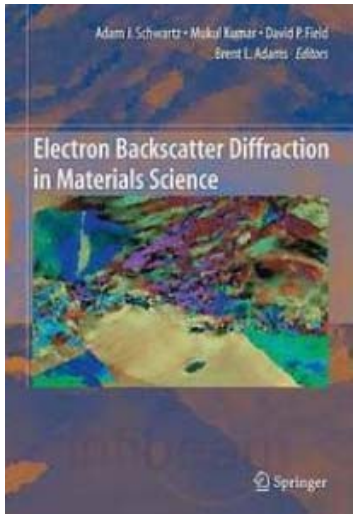
Encompassing the concepts, practice, and application of orientation analysis, “Introduction to Texture Analysis" is an essential reference source for researchers in the field of textures. The authors use a clear style to share their expertise, providing comprehensive coverage of the theory and practice of the texture techniques now available and discusses their applications in research and industry.

The text considers the merits of each technique for specific applications. Case studies expand upon the authors ' explanations and help illustrate the main principles involved. The topics included are basics of crystallography, X-ray, neutron and electron diffraction, applications of SEM- and TEM-based techniques, and texture analyses on a macro- as well as grain-specific level, and 12 case studies.

Electron Backscatter Diffraction in Materials Science

Editors: Adam J. Schwartz, Mukul Kumar, Brent L. Adams and David P. Field

Springer+Business Media LLC, 2009
Hardcover Pages: 403 $ 169.00
EAN: 9780387881355 ISBN-10:0-387-88135-2



Electron backscatter diffraction is a very powerful and relatively new materials characterization technique aimed at the determination of crystallographic texture, grain boundary character distributions, lattice strain, phase identification, and much more. The purpose of this book is to provide the fundamental basis for electron backscatter diffraction in materials science, the current state of both hardware and software, and illustrative examples of the applications of electron backscatter diffraction to a wide-range of materials including undeformed and deformed metals and alloys, ceramics, and superconductors.

The text has been substantially revised from the first edition, and the authors have kept the format as close as possible to the first edition text. The new developments covered in this book include a more comprehensive coverage of the fundamentals not covered in the first edition or other books in the field, the advances in hardware and software since the first edition was published, and current examples of application of electron backscatter diffraction to solve challenging problems in materials science and condensed-matter physics.

TOC: Development of Automated Diffraction in SEM and TEM / theoretical framework for EBSD / representation of texture in orientation space / fundamentals of automated EBSD / phase identification using EBSD / 3D orientation imaging / EBSD - buying a system / hardware and software optimization / advanced software capabilities for automated EBSD / EBSD of ceramic materials / and more.

Moderne Röntgenbeugung

Röntgendiffraktometrie für Materialwissenschaftler, Physiker und Chemiker

Lothar Spieß, Gerd Teichert, Robert Schwarzer, Herfried Behnken und Christoph Genzel
Vieweg + Teubner | GWV Fachverlage GmbH, Wiesbaden 2009

Paperback. 2. überarbeitete und erweiterte Auflage, 564 Seiten 29,90 EUR
ISBN: 978-3-8351-0166-1

Aus dem Inhalt:

- Erzeugung und Eigenschaften von Röntgenstrahlung
- Beugung von Röntgenstrahlung
- Hardware für die Röntgenbeugung
- Methoden der Röntgenbeugung
- Zellparameterbestimmung
- Qualitative Phasenanalyse
- Quantitative Phasenanalyse
- Röntgenprofilanalyse
- Kristallstrukturanalyse
- Röntgenographische Profilanalyse
- Fundamentalparameteranalyse
- Röntgenografische Spannungsanalyse
- Röntgenografische Texturanalyse
- Kristallorientierungsbestimmung
- Besonderheiten bei dünnen Schichten
- Spezielle Verfahren (energiedispersive Verfahren: Synchrotron-, Kikuchi- und Kosseltechnik)
- 26 komplexe Aufgaben und Lösungen

Das Buch bietet einen umfassenden Überblick über die Anwendungen der Röntgenbeugung in Gebieten wie Werkstofftechnik, Metallurgie, Elektrotechnik, Maschinenbau sowie Mikro- und Nanotechnik. Die nötigen Grundkenntnisse der Röntgenbeugung werden fundiert und anschaulich vermittelt. Dabei werden neue Techniken und Auswerteverfahren ebenso dargestellt wie altbekannte Methoden.