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KEY=FROM - ZIMMERMAN ALLEN

Grain Boundaries From Theory to Engineering Springer Science & Business Media Grain boundaries are a main feature of crystalline materials. They play a key role in determining the properties of materials, especially when grain size decreases and even more so with the current improvements of processing tools and methods that allow us to control various elements in a polycrystal. This book presents the theoretical basis of the study of grain boundaries and aims to open up new lines of research in this area. The treatment is light on mathematical approaches while emphasizing practical examples; the issues they raise are discussed with reference to theories. The general approach of the book has two main goals: to lead the reader from the concept of ‘ideal’ to ‘real’ grain boundaries; to depart from established knowledge and address the opportunities emerging through "grain boundary engineering", the control of morphological and crystallographic features that affect material properties. The book is divided in three parts: I ‘From interganular order to disorder’ deals with the concept of the perfect grain boundary, at equilibrium, and questions the maintenance of its crystalline state. II ‘From the ideal to the real grain boundary’ deals with the concept of the faulted grain boundary. It attempts to reveal the influence of the grain boundary structure on its defects, their formation and their accommodation. III ‘From free to constrained grain boundaries’ is devoted to grain boundary ensembles starting from the triple junction (the elemental configuration) to real grain boundary networks in polycrystals This part covers a new and topical development in the field. It presents for the first time an avenue for researchers working on macroscopic aspects, to approach the scale of description of grain boundaries. Audience: graduate students, researchers and engineers in Materials Science and all those scientists pursuing grain boundary engineering in order to improve materials performance. **The Measurement of Grain Boundary Geometry** Routledge As the

selection of material for particular engineering properties becomes increasingly important in keeping costs down, methods for evaluating material properties also become more relevant. One such method examines the geometry of grain boundaries, which reveals much about the properties of the material. Studying material properties from their geometrical measurements, The Measurement of Grain Boundary Geometry provides a framework for a specialized application of electron microscopy for metals and alloys and, by extension, for ceramics, minerals, and semiconductors. The book presents an overview of the developments in the theory of grain boundary geometry and its practical applications in material engineering. It also covers the tunneling electron microscope (TEM), experimental aspects of data collection, data processing, and examples from actual investigations. Each step of the analysis process is clearly described, from data collection through processing, analysis, representation, and display to applications. The book also includes a glossary of terms. Exploring both the experimental and analytical aspects of the subject, this practical reference guide is essential for researchers and students involved in material properties, whether in physics, materials science, metallurgy, or physical chemistry. **Statistical Physics of Grain Boundary Engineering Grain Boundary Segregation in Metals** Springer Science & Business Media Grain boundaries are important structural components of polycrystalline materials used in the vast majority of technical applications. Because grain boundaries form a continuous network throughout such materials, their properties may limit their practical use. One of the serious phenomena which evoke these limitations is the grain boundary segregation of impurities. It results in the loss of grain boundary cohesion and consequently, in brittle fracture of the materials. The current book deals with fundamentals of grain boundary segregation in metallic materials and its relationship to the grain boundary structure, classification and other materials properties. **Energy Research Abstracts Electron Backscatter Diffraction in Materials Science** Springer Science & Business Media 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 comphrensive 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. **An Engineering Theory of Plasticity Grain Boundary Engineering A Symposium in Honour of Professor Karl Aust Kinetics of Non-equilibrium Grain-boundary Segregation Crystallographically Consistent Percolation Theory for Grain Boundary Networks** (Cont.) Although the properties of the simulated microstructures, including

connectivity length and average cluster radius of gyration, are described by the same scaling exponents as in standard percolation theory, the amplitude prefactors in the scaling relationships are changed as a result of the crystallographic constraint. The percolation threshold, an important parameter in microstructural design, is also found to differ from that of standard percolation theory by as much as ±0.05. Although all of the simulated grain boundary networks studied here are distinctly nonrandom, no two cases have the same behavior, the details of which depend strongly on the specific microstructural model. Therefore, a unified approach for locally correlated percolation problems is developed that allows the effects of the requirement for crystallographic consistency to be compared directly from system to system. This new approach can be extended beyond the study of grain boundary networks to include other locally-correlated percolation problems. **Materials Modelling From Theory to Technology** CRC Press In Materials Modelling: From Theory to Technology, a distinguished collection of authors has been assembled to celebrate the 60th birthday of Dr. R. Bullough, FRS and honor his contribution to the subject over the past 40 years. The volume explores subjects that have implications in a wide range of technologies, focusing on how basic research can be applied to real problems in science and engineering. Linking theory and technology, the book progresses from the theoretical background to current and future practical applications of modeling. Accessible to a diverse audience, it requires little specialist knowledge beyond a physics degree. The book is useful reading for postgraduates and researchers in condensed matter, nuclear engineering, and physical metallurgy, in addition to workers in R&D laboratories and the high technology industry. **Modern Physical Metallurgy** Elsevier Modern Physical Metallurgy, Fourth Edition discusses the fundamentals and applications of physical metallurgy. The book is comprised of 15 chapters that cover the experimental background of a metallurgical phenomenon. The text first talks about the structure of atoms and crystals, and then proceeds to dealing with the physical examination of metals and alloys. The third chapter tackles the phase diagrams and solidifications, while the fourth chapter covers the thermodynamics of crystals. Next, the book discusses the structure of alloys. The next four chapters deal with the deformations and defects of crystals, metals, and alloys. Chapter 10 discusses work hardening and annealing, while Chapters 11 and 12 cover phase transformations. The succeeding two chapters talk about creep, fatigue, and fracture, while the last chapter covers oxidation and corrosion. The text will be of great use to undergraduate students of materials engineering and other degrees that deal with metallurgical properties. **Advances in Heterogeneous Material Mechanics 2008 Proceedings of the Second International Conference on Heterogeneous Materials Mechanics, June 3-8, 2008, Huangshan, China** DEStech Publications, Inc This book offers over 400 never before published and rigorously refereed papers demonstrating the connections between nanoscale phenomena and the critical properties of dozens of engineered and natural materials—from polymer composites to human bone. Information is presented on new techniques for studying and quantifying the behavior of materials at nanoscale levels and linking this data to macroscale properties such as strength, fatigue, and failure points. The techniques include novel experiments and uses of instrumentation, as well as modeling and numerical methods. Virtually all the analyses in this book are offered here for the

first time. They include information of value for materials investigators in defense, civil engineering, biomaterials, and transportation **Science and Technology of Interfaces, International Symposium in Honor of Dr. Bhakta Rath** John Wiley & Sons **Scientific and Technical Aerospace Reports** Lists citations with abstracts for aerospace related reports obtained from world wide sources and announces documents that have recently been entered into the NASA Scientific and Technical Information Database. **Sintering Key Papers** Springer Science & Business Media The 4th International Symposium on the Science and Technology of Sintering was held on 4-6 November 1987 in Tokyo. Among the many technical sessions was one entitled 'Session for Sintering-Case Study'. Over 200 participants heard these invited talks. Although some papers were over 20 years old, it is necessary to understand the authors' way of thinking. Since the end of the Second World War, many excellent papers related to sintering have appeared in many different academic journals. Some of these papers are still of value, and are still being read by today's students. The questions we have to ask are: Why does the scholar think this way? Why did the scholar perform his experiments? What is the mechanism of sintering? What is the liquid phase of sintering? What is the behavior of sintering additives? What is the history and development of sintering theory? This book includes these sort of historical papers and also new original papers on sintering, all of which are very important to our understanding of the subject. Several papers have been added for this English edition, which is thus more comprehensive than its Japanese counterpart. These papers were spread out in many different sources and the benefits of collecting them together in book form is obvious. **Advances in Fracture and Damage Mechanics VII** Trans Tech Publications Ltd Volume is indexed by Thomson Reuters CPCI-S (WoS). This volume is made up of contributions from researchers in 22 countries. It aims to promote exchange of the latest experimental and theoretical results on structural integrity, durability and failure analysis; with the emphasis on fracture and damage mechanics. **Property Localization for Grain Boundary Diffusivity Via Inverse Problem Theory** The method presented in this study is derived from a general mathematical expression of inverse problem theory. The derivation of the method is carried step by step by considering diffusivity as the property of interest. The use of the Bayesian probability approach in the inference method makes the uncertainty quantification possible to perform. This study demonstrates how uncertainty quantification for the inferred structure-property models is easily performed within the idealized case framework. The method of quantifying the uncertainty is carried by utilizing the Metropolis-Hastings algorithm and Kernel Density Estimation method. **Grain Boundaries in Metals Grain Boundary Controlled Properties of Fine Ceramics JFCC Workshop Series: Materials Processing and Design** Springer Science & Business Media Selected papers presented at the International Workshop on Fine Ceramics 92, Materials Processing and Design through Better Control of Grain Boundaries: Emphasizing Fine Ceramics, held in Nagoya, Japan, 12-13 March 1992. **Engineering Physics of High-Temperature Materials Metals, Ice, Rocks, and Ceramics** John Wiley & Sons ENGINEERING PHYSICS OF HIGH-TEMPERATURE MATERIALS Discover a comprehensive exploration of high temperature materials written by leading materials scientists In Engineering Physics of High-Temperature Materials: Metals, Ice, Rocks, and Ceramics distinguished researchers

and authors Nirmal K. Sinha and Shoma Sinha deliver a rigorous and wide-ranging discussion of the behavior of different materials at high temperatures. The book discusses a variety of physical phenomena, from plate tectonics and polar sea ice to ice-age and intraglacial depression and the postglacial rebound of Earth's crust, stress relaxation at high temperatures, and microstructure and crack-enhanced Elasto Delayed Elastic Viscous (EDEV) models. At a very high level, Engineering Physics of High-Temperature Materials (EPHTM) takes a multidisciplinary view of the behavior of materials at temperatures close to their melting point. The volume particularly focuses on a powerful model called the Elasto-Delayed-Elastic-Viscous (EDEV) model that can be used to study a variety of inorganic materials ranging from snow and ice, metals, including complex gas-turbine engine materials, as well as natural rocks and earth formations (tectonic processes). It demonstrates how knowledge gained in one field of study can have a strong impact on other fields. Engineering Physics of High-Temperature Materials will be of interest to a broad range of specialists, including earth scientists, volcanologists, cryospheric and interdisciplinary climate scientists, and solid-earth geophysicists. The book demonstrates that apparently dissimilar polycrystalline materials, including metals, alloys, ice, rocks, ceramics, and glassy materials, all behave in a surprisingly similar way at high temperatures. This similarity makes the information contained in the book valuable to all manner of physical scientists. Readers will also benefit from the inclusion of: A thorough introduction to the importance of a unified model of high temperature material behavior, including high temperature deformation and the strength of materials An exploration of the nature of crystalline substances for engineering applications, including basic materials classification, solid state materials, and general physical principles Discussions of forensic physical materialogy and test techniques and test systems Examinations of creep fundamentals, including rheology and rheological terminology, and phenomenological creep failure models Perfect for materials scientists, metallurgists, and glaciologists, Engineering Physics of High-Temperature Materials: Metals, Ice, Rocks, and Ceramics will also earn a place in the libraries of specialists in the nuclear, chemical, and aerospace industries with an interest in the physics and engineering of high-temperature materials. **Amorphous-Nanocrystalline Alloys** CRC Press Amorphous-nanocrystalline alloys are a relatively new class of materials born from the rapid development of new technologies and different methods of producing amorphous and nanocrystalline powders and films, compacting, melt quenching, megaplastic deformation, implantation, laser, plasma, and other high-energy methods. This book considers methods of producing these materials (melt quenching, controlled crystallization, deformation effect, and pulse treatments (photon, laser and ultrasound), spraying thin films, and ion implantation). Theoretical and experimental studies describe plastic deformation mechanisms and physico-mechanical properties. Practical applications are also presented. **Engineering Materials Processing and Texture** John Wiley & Sons This volume contains papers presented at The 15th International Conference on the Texture of Materials from June 1-5th, 2008 in Pittsburgh, PA. Chapters include: Friction Stir Welding and Processing Texture and Anisotropy in Steels Effects of Magnetic Fields Hexagonal Metals Texture in Materials Design View information on Applications of Texture Analysis: Ceramic Transactions, Volume 201. **Materials Structure & Micromechanics of**

Fracture IV MSMF-4 : Proceedings of the Fourth International Conference on Materials Structure & Micromechanics of Fracture, Brno, Czech Republic, June 23-25, 2004 Trans Tech Publication This volume contains papers selected from the more than 120 contributions presented during the 4th international conference on Materials Structure & Micromechanics of Fracture (MSMF-4), in Brno, Czech Republic, June 23-25, 2004. The MSMF-4 conference successfully carried on the tradition of previous conferences. Nearly 150 scientists from 21 countries presented a variety of multiscale approaches to the modeling and testing of deformation and fracture processes in engineering materials. In collaboration with the International Advisory Board, the organizers also asked Prof. A. J. McEvily (University of Connecticut, USA), Prof. W. Dietzel (GKSS-Forschungszentrum Geesthacht GmbH, Germany), Prof. G. E. Beltz (University of Santa Barbara, California, USA) and Prof. T. Kitamura (Kyoto University, Japan) to prepare plenary key-note lectures. In addition, other leading scientists were asked to provide key-note lectures for each section. The resultant papers, ordered approximately in a sequence going from atomistic to mezoscopic to macroscopic, are presented in the first section of these proceedings. The contributed papers are similarly ordered in the second section.The main goal of the book was to demonstrate a variety of multiscale approaches, ranging from atomistic to macroscopic levels, and in this it succeeds admirably. **Handbook of Mechanical Nanostructuring** John Wiley & Sons Providing in-depth information on how to obtain high-performance materials by controlling their nanostructures, this ready reference covers both the bottom-up and the top-down approaches to the synthesis and processing of nanostructured materials. The focus is on advanced methods of mechanical nanostructuring such as severe plastic deformation, including high pressure torsion, equal channel angular processing, cyclic extrusion compression, accumulative roll bonding, and surface mechanical attrition treatment. As such, the contents are inherently application-oriented, with the methods presented able to be easily integrated into existing production processes. In addition, the structure-property relationships and ways of influencing the nanostructure in order to exhibit a desired functionality are reviewed in detail. The whole is rounded off by a look at future directions, followed by an overview of applications in various fields of structural and mechanical engineering. With its solutions for successful processing of complex-shaped workpieces and large-scale specimens with desired properties, this is an indispensable tool for purposeful materials design. **Solar Energy Update Fracture and Damage Mechanics V** Trans Tech Publications Ltd Volume is indexed by Thomson Reuters CPCI-S (WoS). This book, which comprises contributions from researchers in 20 countries, was designed to be a forum within which to promote and exchange the latest experimental and theoretical research work on structural integrity, durability and failure analysis; with the emphasis being placed on fracture and damage mechanics. **Special Report - Corps of Engineers, U.S. Army, Cold Regions Research and Engineering Laboratory Silicon-Based Structural Ceramics for the New Millennium** John Wiley & Sons This volume focuses on recent scientific and technological developments in silicon-based (i.e., silicon nitride, SiAlONs, silicon carbide, silicon oxynitride) structural ceramics. Authors from academia and industry assess the current state of the art in slilicon-based structual ceramics. Industrial case studies are advocated to highlight the development and application

of these materials in real engineering environments. Proceedings of the symposium held at the 104th Annual Meeting of The American Ceramic Society, April 28-May1, 2002 in Missouri; Ceramic Transactions, Volume 142. **Transactions of the American Institute of Mining, Metallurgical and Petroleum Engineers** Some vols., 1920-1949, contain collections of papers according to subject. **Grain Boundary Migration in Metals Thermodynamics, Kinetics, Applications** CRC Press The behavior of adjacent materials at the boundary where they meet is an essential aspect of creating new engineering materials. Grain Boundary Migration in Metals is an authoritative account of the physics of grain boundary motion, written by two highly respected researchers. They provide a comprehensive overview of current knowledge regarding the migration process and how it affects microstructure evolution, focusing their treatment exclusively on the properties and behavior of grain boundaries with well defined geometry and crystallography. With their emphasis on applications-such as the characterization of microstructure and texture, recrystallization, and grain growth-the authors effectively fill the gap between the physics of grain boundary motion and its engineering practicality. The need for better microstructural design motivates permanent thrust for research in the field, and continued rapid progress appears inevitable. Grain Boundary Migration in Metals provides a solid foundation in the phenomena and serves as a valuable reference for professionals in materials science, solid state physics, and any industry engaged in metals production and the heat treatment of metals and alloys. **SOLID MECHANICS FOR MATERIALS ENGINEERS -- Principles and Applications of Mesomechanics** Lulu.com **Magnesium Technology 2019** Springer The Magnesium Technology Symposium, the event on which this collection is based, is one of the largest yearly gatherings of magnesium specialists in the world. Papers represent all aspects of the field, ranging from primary production to applications to recycling. Moreover, papers explore everything from basic research findings to industrialization. Magnesium Technology 2019 covers a broad spectrum of current topics, including alloys and their properties; cast products and processing; wrought products and processing; forming, joining, and machining; corrosion and surface finishing; and structural applications. In addition, there is coverage of new and emerging applications. **Applied Mechanics Reviews Computational Methods and Experiments in Materials Characterization III** WIT Press Until recently, engineering materials could be characterized successfully using relatively simple testing procedures. As materials technology advances, interest is growing in materials possessing complex meso-, micro- and nano-structures, which to a large extent determine their physical properties and behaviour. The purposes of materials modelling are many: optimization, investigation of failure, simulation of production processes, to name but a few. Modelling and characterisation are closely intertwined, increasingly so as the complexity of the material increases. Characterisation, in essence, is the connection between the abstract material model and the real-world behaviour of the material in question. Characterisation of complex materials therefore may require a combination of experimental techniques and computation. This book publishes papers presented at the Third International Conference on Computational Methods and Experiments in Material Characterisation.Topics covered include: Composites; Ceramics; Alloys; Cements and Cement Based Materials; Biomaterials; Thin Films and Coatings;

Advanced Materials; Imaging Analysis; Thermal Analysis; New Methods; Surface Chemistry, Nano Indentation; Continuum Methods; Particle Models; Damage Mechanics; Innovative Techniques; Stochastic Methods. **Engineering; an Illustrated Weekly Journal**
Microstructural Design of Advanced Engineering Materials John Wiley & Sons The choice of a material for a certain application is made taking into account its properties. If, for example one would like to produce a table, a hard material is needed to guarantee the stability of the product, but the material should not be too hard so that manufacturing is still as easy as possible - in this simple example wood might be the material of choice. When coming to more advanced applications the required properties are becoming more complex and the manufacturer`s desire is to tailor the properties of the material to fit the needs. To let this dream come true, insights into the microstructure of materials is crucial to finally control the properties of the materials because the microstructure determines its properties. Written by leading scientists in the field of microstructural design of engineering materials, this book focuses on the evolution and behavior of granular microstructures of various advanced materials during plastic deformation and treatment at elevated temperatures. These topics provide essential background and practical information for materials scientists, metallurgists and solid state physicists. **Who's who in Technology Today Ceramics Science and Technology, Volume 3 Synthesis and Processing** John Wiley & Sons Although ceramics have been known to mankind literally for millennia, research has never ceased. Apart from the classic uses as a bulk material in pottery, construction, and decoration, the latter half of the twentieth century saw an explosive growth of application fields, such as electrical and thermal insulators, wear-resistant bearings, surface coatings, lightweight armour, or aerospace materials. In addition to plain, hard solids, modern ceramics come in many new guises such as fabrics, ultrathin films, microstructures and hybrid composites. Built on the solid foundations laid down by the 20-volume series Materials Science and Technology, Ceramics Science and Technology picks out this exciting material class and illuminates it from all sides. Materials scientists, engineers, chemists, biochemists, physicists and medical researchers alike will find this work a treasure trove for a wide range of ceramics knowledge from theory and fundamentals to practical approaches and problem solutions.