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Plastic Deformation of Materials Severe Plastic Deformation Practical Solution of Plastic Deformation Problems in Elastic-plastic Range Unified Constitutive Laws of Plastic Deformation Mechanics of Plastic Deformation in Metal Processing Plastic Deformation and Strain Hardening On the Effect of Change in Deformation Rate on Plastic Deformation The Plastic Deformation of Metals Fundamentals of the Theory of Plasticity A Symposium on the Plastic Deformation of Crystalline Solids Large Plastic Deformation of Crystalline Aggregates Anisotropy and Localization of Plastic Deformation Materials Science and Technology: Plastic deformation and fracture of materials Testing of the Plastic Deformation of Metals Physical Principles of Plastic Deformation Dislocations and Plastic Deformation Investigations and Applications of Severe Plastic Deformation Sintering and Plastic Deformation Deformation of Ceramic Materials Severe Plastic Deformation Plastic Deformation of Nanostructured Materials Plasticity The plastic deformation of metals Dislocation Dynamics During Plastic Deformation The Plaston Concept Fundamentals and Engineering of Severe Plastic Deformation Plastic Deformation An Experimental Investigation of the Mechanics of Plastic Deformation of Metals Severe Plastic Deformation Effect of Plastic Deformation on Oxidation Rate of Steel Nanostructured Materials by High-Pressure Severe Plastic Deformation A Study of Isochromatic Lines in Transparent Models Under Finite Plastic Deformation Finite Plastic Deformation of Crystalline Solids Constitutive Laws of Plastic Deformation and Fracture Effects on Plastic Deformation by High-frequency Vibrations on Metals Plastic Deformation of Ceramics Testing of the Plastic Deformation of Metals On Plastic Deformation Induced Surface Roughness of Metals Plastic Deformation Plastic Deformation of Polymers

19th Canadian Fracture Conference, Ottawa, Ontario, May 29-31, 1989 Materials Science and Technology A Comprehensive Treatment Edited by R.W. Cahn, P. Haasen, E.J. Kramer The 18-volume series ‘Materials Science and Technology' is the first in-depth, topic-oriented reference work devoted to this growing interdisciplinary field. A compendium of current, state-of-the-art information, it covers the most important classes of materials: metals, ceramics, glasses, polymers, semiconductors, and composites, from the fundamentals of perfect semiconductors via the physics of defects to "artificial" and amorphous semiconductors. Edited by internationally renowned figures in materials science, this series is sure to establish itself as a seminal work. Volume 6: This volume focuses on the mechanisms of plastic deformation and fatigue affecting the properties and performance of a wide variety of materials. Topics included are: flow stress and work hardening • dislocation patterning • solid solution strengthening • particle strengthening • superplasticity • inelastic deformation • cyclic deformation • fracture mechanisms • friction and wear • high-temperature deformation and creep • deformation and textures of metals at large strains High-technology industries using plastic deformation demand soundly-based economical decisions in manufacturing design and product testing, and the unified constitutive laws of plastic deformation give researchers aguideline to use in making these decisions. This book provides extensive guidance in low cost manufacturing without the loss of product quality. Each highly detailed chapter of Unified Constitutive Laws of Plastic Deformation focuses on a distinct set of defining equations. Topics covered include

anisotropic and viscoplastic flow, and the overall kinetics and thermodynamics of deformation. This important book deals with a prime topic in materials science and engineering, and will be of great use toboth researchers and graduate students. Describes the theory and applications of the constitutive law of plastic deformation for materials testing Examines the constitutive law of plastic deformation as it applies to process and product design Includes a program on disk for the determination and development of the constitutive law of plastic deformation Considers economical design and testing methods It has been already well established that the nanostructured materials (materials with a grain size of 100mm or less) is the future materials. Nanostructured materials possess properties superior to those of conventional, coarse grained materials. Hence designing potentially cost efficient and environmentally friendly products with better performance is a possibility. Among others, nanostructured materials exhibit increased strength, hardness and ductility and provide an opportunity for superplastic forming. When all the procedures in use for the production of nanostructured materials are examined, only severe plastic deformation (SPD) processes exhibit a potential for producing relatively large samples suitable for industrial applications. In this monograph, the state-of-the-art on severe plastic deformation methods is presented in one volume. The monograph is organised into eight chapters, each of which contains papers on different aspect of severe plastic deformation methods prepared by the experts in this field. The topics covered in the monograph are structure formation, phase transformation, superplasticity, mechanical properties of nanostructured materials, electronic and magnetic properties of nanostructured materials, deformation analysis, novel SPD methods, commercialisation of ECAE method. This open access book presents the novel concept of plaston, which accounts for the high ductility or large plastic deformation of emerging high-performance structural materials, including bulk nanostructured metals, hetero-nanostructured materials, metallic glasses, intermetallics, and ceramics. The book describes simulation results of the collective atomic motion associated with plaston, by computational tools such as first-principle methods with predictive performance and large-scale atom-dynamics calculations. Multi-scale analyses with state-of-the art analytical tools nano/micro pillar deformation and nano-indentation experiments are also described. Finally, through collaborative efforts of experimental and computational work, examples of rational design and development of new structural materials are given, based on accurate understanding of deformation and fracture phenomena. This publication provides a valuable contribution to the field of structural materials research. Intended for use by advanced engineering students and professionals, this volume focuses on plastic deformation of metals at normal temperatures, as applied to strength of machines and structures. 1971 edition. Recently, it was reported that nanostructured materials processed under high pressure by HPT and ECAP have an extraordinary combination of both high strength and high ductility, which are two desirable, but rarely co-existing properties. These findings indicate that high-pressure is a critical factor that can be employed to process nanostructured materials with superior mechanical, and possibly also physical, properties. It is the objective of this workshop to review our current knowledge, identify issues for future research, and discuss future directions on the processing and properties of nanostructured materials via SPD techniques, with a special emphasis on high-pressure effects. The 42 peer-reviewed papers in this book cover areas of high pressure effect on the nanostructure and properties of SPD-processed materials, fundamentals of nanostructured materials, development of high-pressure SPD technologies for commercializations, recent advances of SPD technologies as well as applications and future markets of SPD-processed nanostructured materials. Explores the Principles of Plasticity Most undergraduate programs lack an undergraduate plasticity theory course, and many graduate programs in design and manufacturing lack a course on plasticity—leaving a number of engineering students without adequate information on the subject. Emphasizing stresses generated in the material and its effect, Plasticity: Fundamentals and Applications effectively addresses this need. This book fills a void by introducing the basic fundamentals of solid mechanics of

deformable bodies. It provides a thorough understanding of plasticity theory, introduces the concepts of plasticity, and discusses relevant applications. Studies the Effects of Forces and Motions on Solids The authors make a point of highlighting the importance of plastic deformation, and also discuss the concepts of elasticity (for a clear understanding of plasticity, the elasticity theory must also be understood). In addition, they present information on updated Lagrangian and Eulerian formulations for the modeling of metal forming and machining. Topics covered include: Stress Strain Constitutive relations Fracture Anisotropy Contact problems Plasticity: Fundamentals and Applications enables students to understand the basic fundamentals of plasticity theory, effectively use commercial finite-element (FE) software, and eventually develop their own code. It also provides suitable reference material for mechanical/civil/aerospace engineers, material processing engineers, applied mechanics researchers, mathematicians, and other industry professionals. Material processing techniques that employ severe plastic deformation have evolved over the past decade, producing metals, alloys and composites having extraordinary properties. Variants of SPD methods are now capable of creating monolithic materials with submicron and nanocrystalline grain sizes. The resulting novel properties of these materials has led to a growing scientific and commercial interest in them. They offer the promise of bulk nanocrystalline materials for structural; applications, including nanocomposites of lightweight alloys with unprecedented strength. These materials may also enable the use of alternative metal shaping processes, such as high strain rate superplastic forming. Prospective applications for medical, automotive, aerospace and other industries are already under development. The book gives a comprehensive view of the present ability to take into account the microstructure and texture evolution in building up engineering models of the plastic behaviour of polycrystalline materials at large strains. It is designed for postgraduate students, research engineers and academics that are interested in using advanced models of the mechanical behaviour of polycrystalline materials. This book discusses the processes, properties and applications of plastic deformation. The first chapter provides short notes on the grains modification induced by local plastic deformation. Chapter Two examines energy accumulation and mechanisms of plastic deformation in organic glassy polymers. Chapter Three investigates the microstructure and texture of the pure magnesium foils obtained by room temperature reverse extrusion followed by cold rolling. The final chapter discusses utilization of severe plastic deformation (SPD) to produce ultrafine grained structures using top-down approach in novel metal forming processes. Discover a novel approach to the subject, providing detailed information about established and innovative mechanical testing procedures. Publisher Description Severe Plastic Deformation: Methods, Processing and Properties examines all severe plastic deformation techniques developed over the past two decades, exploring the appropriate severe plastic deformation method for a particular case. The book offers an overview of these methods, introduces ultrafine-grained and nano-grained metals and methods for various bulk, sheet, tubular and large size samples, reviews effective parameters to make a severe plastic deformation method better, from property (mechanical) and processing (cost, time, load, etc.) viewpoints, discusses mechanical, physical and chemical properties of UFG and NS metals, and concludes with various applications for these methods. Over the last several decades, a large number of severe plastic deformation methods have been developed for processing a wide array of metals for superior properties, making this a timely resource. Severe Plastic Deformation: Methods, Processing and Properties examines all severe plastic deformation techniques developed over the past two decades, exploring the appropriate severe plastic deformation method for a particular case. The book offers an overview of these methods, introduces ultrafine-grained and nano-grained metals and methods for various bulk, sheet, tubular and large size samples, reviews effective parameters to make a severe plastic deformation method better, from property (mechanical) and processing (cost, time, load, etc.) viewpoints, discusses mechanical, physical and chemical properties of UFG and NS metals, and concludes with various applications for these methods. Over the last several

decades, a large number of severe plastic deformation methods have been developed for processing a wide array of metals for superior properties, making this a timely resource. Collects all severe plastic deformation methods in a unique reference Compares severe plastic deformation methods from several viewpoints, including processing and final property Classifies severe plastic deformation methods based on the sample shape and mechanics, as well as the properties achieved in the processed metal Introduces ultrafine-grained and nano-grained metals and methods for various bulk, sheet, tubular and large size samples Discover a novel, self-contained approach to an important technical area, providing both theoretical background and practical details. Coverage includes mechanics and physical metallurgy, as well as study of both established and novel procedures such as indentation plastometry. Numerical simulation (FEM modelling) is explored thoroughly, and issues of scale are discussed in depth. Discusses procedures designed to explore plasticity under various conditions, and relates sample responses to deformation mechanisms, including microstructural effects. Features references throughout to industrial processing and component usage conditions, to a wide range of metallic alloys, and to effects of residual stresses, anisotropy and inhomogeneity within samples. A perfect tool for materials scientists, engineers and researchers involved in mechanical testing (of metals), and those involved in the development of novel materials and components. Present developments in materials science, mechanics and engineering, as well as the demands of modern technology, result in a new and growing interest in plasticity and in bordering domains of the mechanical behavior of materials. This growing interest is attested to by the success of both The International Journal of Plasticity, which after its inception rapidly became the leading journal for plasticity research, and the series ofInternational Symposia on Plasticity and Its Current Applications, which is now the premier international forum for plasticity research dissemination. The First International Symposium on Plasticity and Its Current Applications was conceived and organized by Professor Akhtar S. Khan, and was held at the University of Oklahoma (Norman, Oklahoma, USA) from July 30 to August 3, 1984. It was attended by over one hundred scientists from fifteen countries. "Plasticity '89: the Second International Symposium on Plasticity and Its Current Applications" was held at Mie University (Tsu, Japan) from July 31 to August 4, 1989; this symposium was co-chaired by Professors Khan and Tokuda. The main emphasis of this meeting was on dynamic plasticity and micromechanics, although it included other aspects of plasticity as well. It was attended by over two hundred researchers from twenty-three nations. Plastic Deformation of Nanostructured Materials offers comprehensive analysis on the most important data and results in the field of materials strength and mechanics. This reference systematically examines the special features of the mechanical behavior and corresponding structural mechanisms of crystal structure defects with grain sizes that range from meso- to micro- levels. The book is organized into six chapters. Each chapter gives special attention to various topics including a detailed analysis of the main components of the dislocation structure, the conditions of transition from dislocation slip to grain boundary sliding as well as present studies concerned with the nature of severe plastic deformation processes. An indispensable reference for scientists, engineers, postgraduate students and others working in the physics of strength and development of highly efficient constructional multifunctional materials, Plastic Deformation of Nanostructured Materials highlights current interests on the structural mechanisms of plastic deformation of ultrafine-grained and nanostructured materials. Book jacket. This proceedings volume, "Plastic Deformation of Ceramics," constitutes the papers of an international symposium held at Snowbird, Utah from August 7-12, 1994. It was attended by nearly 100 scientists and engineers from more than a dozen countries representing academia, national laboratories, and industry. Two previous conferences on this topic were held at The Pennsylvania State University in 1974 and 1983. Therefore, the last major international conference focusing on the deformation of ceramic materials was held more than a decade ago. Since the early 1980s, ceramic materials have progressed through an evolutionary period of development and advancement. They are now under consideration for

applications in engineering structures. The contents of the previous conferences indicate that considerable effort was directed towards a basic understanding of deformation processes in covalently bonded or simple oxide ceramics. However, now, more than a decade later, the focus has completely shifted. In particular, the drive for more efficient heat engines has resulted in the development of silicon-based ceramics and composite ceramics. The discovery of high-temperature cupric oxide-based superconductors has created a plethora of interesting perovskite-Iike structured ceramics. Additionally, nanophase ceramics, ceramic thin films, and various forms of toughened ceramics have potential applications and, hence, their deformation has been investigated. Finally, new and exciting areas of research have attracted interest since 1983, including fatigue, nanoindentation techniques, and superplasticity. This publication is based upon lectures given during a well-received course on physical metallurgy and originally intended for students specializing in fields related to metallic materials. But, as the author points out, metallic materials are the most widely investigated group of materials and their study therefore gives a good basis for understanding how other materials can be made to reveal interrelationships between their structures and properties; especially with regard to those properties associated with strain. Similar types of rule can then be applied to other materials, in spite of their apparent differences. Along with numerous illustrative examples, this text provides an overview of the dynamic behavior of dislocations and its relation to plastic deformation. It introduces the general properties of dislocations and treats the dislocation dynamics in some detail. Dislocations and Plastic Deformation deals with dislocations and plastic deformation, and specifically discusses topics ranging from deformation of single crystals and dislocations in the lattice to the fundamentals of the continuum theory, the properties of point defects in crystals, multiplication of dislocations, and partial dislocations. The effect of lattice defects on the physical properties of metals is also considered. Comprised of nine chapters, this book begins by providing a short and, where possible, precise explanation of dislocation theory. The first six chapters discuss the properties of dislocations and point defects both in crystals and in an elastic continuum. The reader is then introduced to some applications of dislocation theory that show, for instance, the difficulties involved in understanding the hardening of alloys and the work-hardening of pure metals. This book concludes by analyzing the effect of heat treatment on the defect structure in metals. This text will be of interest to students and practitioners in the field of physics. Recent extensive activity on severe plastic deformation (SPD) as a new materials processing technology has generated vast experimental and analytical amounts of information. However, there is still a strong need for a multidisciplinary understanding of SPD. This book consists of in-depth analyses of the fundamentals and engineering of SPD on processing mechanics, the micro-mechanics of plastic deformation and the physics of the structure-properties relationship. This book bridges the gap between existing approaches, resolves certain controversies, and provides a united description of SPD at different scales. Treatise on Materials Science and Technology, Volume 6: Plastic Deformation of Materials covers the fundamental properties and characterization of materials, ranging from simple solids to complex heterophase systems. The book presents articles on the low temperature of deformation of bcc metals and their solid-solution alloys; the cyclic deformation of metals and alloys; and the high-temperature diffusion-controlled creep of some metals and alloys, with particular reference to the various creep mechanisms. The text also includes articles on superplasticity; the fatigue deformation of polymers; the low temperature deformation of crystalline nonmetals; and the recovery and recrystallization during high temperature deformation. Professional scientists and engineers, as well as graduate students in materials science and associated fields will find the book invaluable.