

# Superplasticity in metals and ceramics

T.G. Nieh, J. Wadsworth and O.D. Sherby

Cambridge Solid State Science Series



# Superplasticity In Metals Ceramics Int

**O Kanert, J-m Spaeth**



## **Superplasticity In Metals Ceramics Int:**

*Superplasticity of Alloys, Intermetallics and Ceramics* Oscar A. Kaibyshev, 2012-12-06 Superplasticity is shown to be a universal phenomenon in materials ranging from metals and intermetallics to ceramics Superplastic deformation facilitates the production of materials with specifically chosen properties This is illustrated using the examples of Mg Al and Ti based commercial alloys steels and superalloys Some of the strenghts of this book are the broad range of materials studied the reduction of scientific results to a form suitable for the practitioner a profound physical analysis of the phenomenon a new approach to superplastic treatment as a kind of strain heat treatment the presentation of new data on superplastic flow and on production techniques of micro and submicrocrystalline structures *Superplasticity in Metals, Ceramics, and Intermetallics: Volume 196* M. J. Mayo, M. Kobayashi, J. Wadsworth, 1990 The MRS Symposium Proceeding series is an internationally recognised reference suitable for researchers and practitioners 13th International Conference on Aluminum Alloys (ICAA 13) Hasso Weiland, Anthony Rollett, William Cassada, 2017-02-28 This is a collection of papers presented at the 13th International Conference on Aluminum Alloys ICAA 13 the premier global conference for exchanging emerging knowledge on the structure and properties of aluminum materials The papers are organized around the topics of the science of aluminum alloy design for a range of market applications the accurate prediction of material properties novel aluminum products and processes and emerging developments in recycling and applications using both monolithic and multi material solutions *Plastic Deformation of Ceramics* R.C. Bradt, C.A. Brookes, J.L. Routbort, 2013-11-11 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 like 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 *Grain Boundary Controlled Properties of Fine Ceramics* Kozo Ishizaki, K. Niihara, M. Isotani, R.G.

Ford, 2012-12-06 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

*Superplastic Flow* K.A. Padmanabhan, R.A. Vasin, F.U. Enikeev, 2012-12-06 Superplasticity is the ability of polycrystalline materials under certain conditions to exhibit extreme tensile elongation in a nearly homogeneous isotropic manner. Historically this phenomenon was discovered and systematically studied by metallurgists and physicists. They along with practising engineers used materials in the superplastic state for materials forming applications. Metallurgists concluded that they had the necessary information on superplasticity and so theoretical studies focussed mostly on understanding the physical and metallurgical properties of superplastic materials. Practical applications in contrast were led by empirical approaches, rules of thumb and creative design. It has become clear that mathematical models of superplastic deformation as well as analyses for metal working processes that exploit the superplastic state are not adequate. A systematic approach based on the methods of mechanics of solids is likely to prove useful in improving the situation. The present book aims at the following: 1 Outline briefly the techniques of mechanics of solids particularly as it applies to strain rate sensitive materials 2 Assess the present level of investigations on the mechanical behaviour of superplastics 3 Formulate the main issues and challenges in mechanics of superplasticity 4 Analyse the mathematical models constitutive equations for superplastic flow from the viewpoint of mechanics 5 Review the models of superplastic metal working processes 6 Indicate with examples new results that may be obtained using the methods of mechanics of solids

**Mechanical Properties and Deformation Behavior of Materials Having Ultra-Fine Microstructures** M. Nastasi, Don M. Parkin, Herbert Gleiter, 2012-12-06 In an attempt to meet the demand for new ultra high strength materials the processing of novel material configurations with unique microstructure is being explored in systems which are further and further from equilibrium. One such class of emerging materials is the so called nanophased or nanostructured materials. This class of materials includes metals and alloys, ceramics and polymers characterized by controlled ultra fine microstructural features in the form of layered, fibrous or phase and grain distribution. While it is clear that these materials are in an early stage of development there is now a sufficient body of literature to fuel discussion of how the mechanical properties and deformation behavior can be controlled through control of the microstructure. This NATO Advanced Study Institute was convened in order to assess our current state of knowledge in the field of mechanical properties and deformation behavior in materials with ultra fine microstructure to identify opportunities and needs for further research and to identify the potential for technological applications. The Institute was the first international scientific meeting devoted to a discussion on the mechanical properties and deformation behavior of materials having grain sizes down to a few nanometers. Included in these discussions were the topics of superplasticity, tribology and the supermodulus effect. Lectures were also presented which covered a variety of other themes including synthesis, characterization, thermodynamic stability and general physical properties.

**Transport Phenomena in Food**

**Processing, First International Conference Proceedings** Selcuk Guceri, 1992-11-30      Superplasticity in Metals and Ceramics T. G. Nieh, J. Wadsworth, O. D. Sherby, 1997-01-23 This book describes advances in the field of superplasticity the ability of certain materials to undergo very large tensile strains This phenomenon has increasing commercial applications but also presents a fascinating scientific challenge in attempts to understand the physical mechanisms that underpin it The authors emphasize the materials aspects of superplasticity Beginning with a brief history of the phenomenon they describe the two major types of superplasticity fine structure and internal stress superplasticity and discuss their operative mechanisms They also present microstructural factors controlling the ductility and fracture in superplastic materials Observations of superplasticity in metals including aluminum magnesium iron titanium and nickel ceramics including monoliths and composites intermetallics including iron nickel and titanium base and laminates are thoroughly described This is a valuable text for graduate students and researchers in materials science and engineering      **5th International Symposium on Ceramic Materials and Components for Engines, Shanghai, China, 29 May-1 June 1994** International Symposium on Ceramic Materials and Components for Engines 1994, Shanghai, China, 1995 The 5th of a prestigious series of conferences these proceedings are devoted to the latest achievements in ceramic materials and components for engines Their purpose is to advance structural ceramics and ceramic engine technology on a worldwide scale and provide a state of the art survey of this increasingly important field The papers presented cover many aspects from basic research and development to production properties and applications These proceedings will be of interest to ceramists and mechanical engineers concerned with the potential use of ceramic components in engines      *Advanced Biomaterials and Biodevices* Ashutosh Tiwari, Anis N. Nordin, 2014-06-30 This cutting edge book focuses on the emerging area of biomaterials and biodevices that incorporate therapeutic agents molecular targeting and diagnostic imaging capabilities The design and development of biomaterials play a significant role in the diagnosis treatment and prevention of diseases When used with highly selective and sensitive biomaterials cutting edge biodevices can allow the rapid and accurate diagnosis of disease creating a platform for research and development especially in the field of treatment for prognosis and detection of diseases in the early stage This book emphasizes the emerging area of biomaterials and biodevices that incorporate therapeutic agents molecular targeting and diagnostic imaging capabilities The 15 comprehensive chapters written by leading experts cover such topics as The use of severe plastic deformation technique to enhance the properties of nanostructured metals Descriptions of the different polymers for use in controlled drug release Chitin and chitosan as renewable healthcare biopolymers for biomedical applications Innovated devices such as label free biochips and polymer MEMS Molecular imprinting and nanotechnology Prussian Blue biosensing applications The evaluation of different types of biosensors in terms of their cost effectiveness selectivity and sensitivity Stimuli responsive polypeptide nanocarriers for malignancy therapeutics      *Nanostructured Materials* Jackie Ying, 2001-12-14 This thematic volume of Advances in Chemical Engineering presents

the latest advances in the exciting interdisciplinary field of nanostructured materials Written by chemical engineers chemists physicists materials scientists and bioengineers this volume focuses on the molecular engineering of materials at the nanometer scale for unique size dependent properties It describes a bottom up approach to designing nanostructured systems for a variety of chemical physical and biological applications Magnesium Materials Yoshiki Oshida,2021-02-08 The book provides an introduction to the topic of magnesium materials for biomedical applications Additional to the background on magnesium s physical chemical and mechanical properties areas of use related diseases and pathways for biodegradation will be discussed Also an outlook of the future of magnesium material applications will be provided **20th Annual Conference on Composites, Advanced Ceramics, Materials, and Structures - A, Volume 17, Issue 3** John B. Wachtman,2009-09-28 This volume is part of the Ceramic Engineering and Science Proceeding CESP series This series contains a collection of papers dealing with issues in both traditional ceramics i e glass whitewares refractories and porcelain enamel and advanced ceramics Topics covered in the area of advanced ceramic include bioceramics nanomaterials composites solid oxide fuel cells mechanical properties and structural design advanced ceramic coatings ceramic armor porous ceramics and more **Creep and Fracture of Engineering Materials and Structures: Proceedings of the 9th International Conference: Proceedings of the 9th International Conference** J.D. Parker,2024-11-01 This volume contains the 75 papers from the Proceedings of the 9th International Conference on Creep and Fracture of Engineering Materials and Structures held at University of Wales Swansea 1st April 4th April 2001 *Metal, Ceramic and Polymeric Composites for Various Uses* John Cuppoletti,2011-07-20 Composite materials often shortened to composites are engineered or naturally occurring materials made from two or more constituent materials with significantly different physical or chemical properties which remain separate and distinct at the macroscopic or microscopic scale within the finished structure The aim of this book is to provide comprehensive reference and text on composite materials and structures This book will cover aspects of design production manufacturing exploitation and maintenance of composite materials The scope of the book covers scientific technological and practical concepts concerning research development and realization of composites *Defects In Insulating Materials - Proceedings Of The Xii International Conference (In 2 Volumes)* O Kanert,J-m Spaeth,1993-06-18 The proceedings reflect the Twelfth International Conference on Defects in Insulating Materials covering topics on point defects and extended defects including theory and computer simulation in various insulating materials as well as applications in laser physics imaging data storage and radioactive waste disposal **Magnesium** Karl U. Kainer,2006-03-06 The need for light weight materials especially in the automobile industry created renewed interest in innovative applications of magnesium materials This demand has resulted in increased research and development activity in companies and research institutes in order to achieve an improved property profile and better choice of alloy systems Here development trends and application potential in different fields like the automotive industry and communication technology

are discussed in an interdisciplinary framework      Micro- and Macromechanical Properties of Materials Yichun Zhou, Li Yang, Yongli Huang, 2013-09-26 This is an English translation of a Chinese textbook that has been designated a national planned university textbook the highest award given to scientific textbooks in China The book provides a complete overview of mechanical properties and fracture mechanics in materials science mechanics and physics It details the macro and micro mechanical properties of metal structural materials nonmetal structural materials and various functional materials It also discusses the macro and micro failure mechanism under different loadings and contains research results on thin film mechanics smart material mechanics and more      Science and Technology of Interfaces Sreeramamurthy Ankem, C. S. Pande, I. Ovid'ko, Subramanyam Ranganathan, 2013-09-30 The International Symposium was organized to capture the state of our knowledge on the science and technology of interfaces The Symposium in honor of Dr B B Rath was held during the TMS Annual meeting Feb 17 21 2002 at Seattle WA This volume captures the salient papers presented at the symposium The symposium was sponsored by the Structural Materials Division and the Electronic Magnetic Photonic Materials Division of TMS and the Materials Science Critical Technology Sector of ASM International and in particular by the following committees the Physical Metallurgy Committee TMS the Superconducting Materials Committee TMS the Titanium Committee TMD and the Mechanical Behavior of Materials Committee TMS ASM The objective of this symposium was to present current research on advanced interface controlled materials with primary focus on advanced materials Special attention was given to design of such interface controlled materials with their unique and highly desirable properties The symposium was designed to assess the current status and to identify future directions of research design and applications of the role of interfaces in nanostructured bulk solids films and coatings as well as polycrystalline superconducting materials Particular emphasis was placed on developing close interactions and fostering future collaborations among scientists and engineers from the USA Western and Eastern Europe Russia and other Asian countries

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