

High-Intensity Ultrasonics

Theory and Industrial Applications

Oleg V. Abramov



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Highintensity Ultrasonics Theory And Industrial Applications

Iakovos Tzanakis, Dmitry Eskin



Highintensity Ultrasonics Theory And Industrial Applications:

High-Intensity Ultrasonics O V Abramov, 2019-06-21 Presenting a comprehensive description of the theory and physics of high intensity ultrasound this book also deals with a wide range of problems associated with the industrial applications of ultrasound mainly in the areas of metallurgy and mineral processing The book is divided into three sections and Part I introduces the reader to the theory and physics of high intensity ultrasound Part II considers the design of ultrasonic generators mechanoacoustic radiators and other vibrational systems as well as the control of acoustic parameters when vibrations are passed into a processed medium Finally Part III describes problems associated with various uses of high intensity ultrasound in metallurgy The applications of high intensity ultrasound for metal shaping thermal and thermochemical treatment welding cutting refining and surface hardening are also discussed here This comprehensive monograph will provide an invaluable source of information which has been largely unavailable in the West until now

Ultrasonic Treatment of Light Alloy Melts Georgy I. Eskin, Dmitry G. Eskin, 2014-08-20 Spawned by growing interest in ultrasonic technology and new developments in ultrasonic melt processing the Second Edition of *Ultrasonic Treatment of Light Alloy Melts* discusses use of ultrasonic melt treatment in direct chill casting shape casting rapid solidification zone refining and more exploring the effects of power ultrasound on melt degassing filtration and refinement in aluminum and magnesium alloys The fully revised and restructured Second Edition Contains new in depth coverage of composite and nanocomposite materials Provides a historical review of the last century of ultrasonic applications to metallurgy Emphasizes the fundamentals mechanisms and applications of ultrasonic melt processing in different light metal technologies Features new chapters on ultrasonic grain refinement refinement of primary solid phases and semi solid processing of billets with nondendritic structure Includes significant updates reflecting results obtained over the past two decades on different scales from laboratory to full scale industrial implementations Complete with many new figures and examples *Ultrasonic Treatment of Light Alloy Melts* Second Edition delivers a comprehensive treatise on ultrasonic melt processing and cavitation presenting essential guidelines for practical use and further development of the technology

Power Ultrasonics Juan A. Gallego-Juarez, Karl F. Graff, Margaret Lucas, 2023-04-06 *Power Ultrasonics Applications of High Intensity Ultrasound* Second Edition provides a comprehensive reference on the fundamentals processing engineering medical food and pharmaceutical applications of ultrasonic processing Chapters cover the fundamentals of nonlinear propagation of ultrasonic waves in fluids and solids discuss the materials and designs of power ultrasonic transducers and devices identify applications of high power ultrasound in materials engineering and mechanical engineering food processing technology environmental monitoring and remediation and industrial and chemical processing including pharmaceuticals medicine and biotechnology and cover developments in ultrasound therapy and surgery applications The new edition also includes recent advances in modeling characterization and measurement techniques along with additive manufacturing and micromanufacturing This is an

invaluable reference for graduate students and researchers working in the disciplines of materials science and engineering In addition those working on the physics of acoustics sound and ultrasound sonochemistry acoustic engineering and industrial process technology R D managers production and biomedical engineers will find it useful to their work Covers the fundamentals of nonlinear propagation of ultrasonic waves in fluids and solids Discusses the materials and designs of power ultrasonic transducers and devices Considers state of the art power sonic applications across a wide range of industries

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

Ultrasonic Cavitation Treatment of Metallic Alloys

Iakovos Tzanakis,Dmitry Eskin,2020-02-05 This Special Issue scrutinizes the use of ultrasonic cavitation melt treatment in technology of high quality metallic alloys with improved mechanical properties and assesses the driving mechanisms of cavitation induced effects such as grain refinement degassing wetting and particle distribution In this context the research published in this Special Issue considers the interaction between the cavitation field and acoustic streaming with the melt flow and the suspended solid liquid phases the characterization and mapping of cavitation activity in a melt volume and the possibility of achieving high efficiency in processing large melt volumes through technological approaches for the commercial implementation of ultrasonic processing technology

Emerging Technologies in Meat Processing Enda J.

Cummins,James G. Lyng,2016-11-18 Meat is a global product which is traded between regions countries and continents The onus is on producers manufacturers transporters and retailers to ensure that an ever demanding consumer receives a top quality product that is free from contamination With such a dynamic product and market place new innovative ways to process package and assess meat products are being developed With ever increasing competition and tighter cost margins industry has shown willingness to engage in seeking novel innovative ways of processing packaging and assessing meat products while maintaining quality and safety attributes This book provides a comprehensive overview on the application of novel processing techniques It represents a standard reference book on novel processing packaging and assessment methods of meat and meat products It is part of the IFST Advances in Food Science book series

Novel Thermal and

Non-Thermal Technologies for Fluid Foods Patrick J. Cullen,Brijesh K. Tiwari,Vasilis Valdramidis,2011-08-17 Chapter 1

Status and Trends of Novel Thermal and Non Thermal Technologies for Fluid Foods Chapter 2 Fluid Dynamics in Novel

Thermal and Non Thermal Processes Chapter 3 Fluid Rheology in Novel Thermal and Non Thermal Processes Chapter 4

Pulsed Electric Field Processing of Fluid Foods Chapter 5 High Pressure Processing of Fluid Foods Chapter 6 Ultrasound

Processing of Fluid Foods Chapter 7 Irradiation of Fluid Foods Chapter 8 Ultraviolet and Pulsed Light Processing of Fluid Foods Chapter 9 Ozone Processing of Fluid Foods Chapter 10 Dense Phase Carbon Dioxide Processing of Fluid Foods Chapter 11 Ohmic Heating of Fluid Foods Chapter 12 Microwave Heating of Fluid Foods Chapter 13 Infrared Heating of Fluid Foods Chapter 14 Modelling the Kinetics of Microbial and Quality Attributes of Fluid Food during Novel Thermal and Non Thermal Processes Chapter 15 Regulatory and Legislative issues for Thermal and Non Thermal Technologies An EU Pers

Proceedings of the 8th Pacific Rim International Conference on Advanced Materials and Processing (PRICM-8) FernD.S. Marquis,2017-03-21 PRICM 8 features the most prominent and largest scale interactions in advanced materials and processing in the Pacific Rim region The conference is unique in its intrinsic nature and architecture which crosses many traditional discipline and cultural boundaries This is a comprehensive collection of papers from the 15 symposia presented at this event

Ultrasonic Micro/nano Manipulations: Principles And Examples Junhui Hu,2014-03-13 Demands for high performance micro nano manipulations from the manufacture of microelectronic and photonic devices biomedical apparatus nanoscience and nanotechnology renewable energy environment protection and high end appliances have been rapidly increasing in recent years However there are very few books on ultrasonic manipulation technology which is one of the important means in micro nano manipulations This unique title gives the basic physical principles of ultrasonic micro nano manipulations and highlights methods of implementing these principles The nonlinear effects of ultrasound are described in details after piezoelectric transduction and acoustic field are introduced and discussed Numerous important examples are given in this book to help readers better understand the applications of these principles and characteristics of ultrasonic manipulators utilizing these principles The examples cover the manipulations of micro solids nanoscale entities droplets and microfluid This indispensable book will contribute positively to the development and application of micro nano manipulation technology

Light Metals 2017 Arne P. Ratvik,2017-02-10 The Light Metals symposia at the TMS Annual Meeting Exhibition present the most recent developments discoveries and practices in primary aluminum science and technology The annual Light Metals volume has become the definitive reference in the field of aluminum production and related light metal technologies The 2017 collection includes papers from the following symposia Alumina and BauxiteAluminum Alloys Processing and CharacterizationAluminum Reduction TechnologyCast Shop TechnologyCast Shop Technology Recycling and Sustainability Joint SessionElectrode TechnologyThe Science of Melt Refining An LMD Symposium in Honor of Christian Simensen and Thorvald Abel Engh

Liposomes Angel Catala,2017-10-25 Liposomes have received increased attention in recent years Nevertheless liposomes due to their various forms and applications require further investigation These structures can deliver both hydrophilic and hydrophobic drugs Preparation of liposomes results in different properties for these systems In addition there are many factors and difficulties that affect the development of liposome drug delivery structure The purpose of this book is to concentrate on recent

developments on liposomes The articles collected in this book are contributions by invited researchers with a long standing experience in different research areas We hope that the material presented here is understandable to a broad audience not only scientists but also people with general background in many different biological sciences This volume offers you up to date expert reviews of the fast moving field of liposomes **Light Metals 2012** Carlos Suarez,2016-12-23 An update of the definitive annual reference source in the field of aluminum production and related light metals technologies a great mix of materials science and practical applied technology surrounding aluminum bauxite aluminum reduction rolling casting and production **Ultrasonic Nano/Microfabrication, Handling, and Driving** Junhui Hu,2024-02-14 Ultrasonic nano microfabrication handling and driving is an emerging actuation technology which utilizes ultrasonic vibration and the physical effects of ultrasonic vibration in fluids and solids to implement the fabrication handling and driving of nano micro scale objects This book provides readers with the fundamentals principles and characteristics of the ultrasonic devices for nano micro fabrication handling and driving and design methods of the devices Introduces fundamental concepts and offers examples of ultrasonic nano fabrication including ultrasonic nano rolling cutting and coating methods Features a wealth of examples to illustrate the ultrasonic concentration and ultrasonic tweezers Explains the principles of ultrasonic driving of gas molecules and demonstrates their applications in high performance gas sensor systems and metal air flow batteries Teaches the principles of ultrasonic driving of microfluids and their applications in metal air flow batteries and cooling of small solid heat sources Provides examples for the finite element method FEM modeling and computation of ultrasonic devices for nano micro fabrication handling and driving Summarizes the current and future trends in ultrasonic nano microfabrication handling and driving This book shares the advances methods and applications of ultrasonic micro nano fabrication techniques for entry level and advanced readers working on nano microfabrication gas sensing biological sensing metal air batteries electronic component cooling and other related areas **Ultrasound in Food Processing** Mar Villamiel,José V. García-Pérez,Antonia Montilla,Juan A. Carcel,Jose Benedito,2017-05-08 Part I Fundamentals of ultrasound This part will cover the main basic principles of ultrasound generation and propagation and those phenomena related to low and high intensity ultrasound applications The mechanisms involved in food analysis and process monitoring and in food process intensification will be shown Part II Low intensity ultrasound applications Low intensity ultrasound applications have been used for non destructive food analysis as well as for process monitoring Ultrasonic techniques based on velocity attenuation or frequency spectrum analysis may be considered as rapid simple portable and suitable for on line measurements Although industrial applications of low intensity ultrasound such as meat carcass evaluation have been used in the food industry for decades this section will cover the most novel applications which could be considered as highly relevant for future application in the food industry Chapters addressing this issue will be divided into three subsections 1 food control 2 process monitoring 3 new trends Part III High intensity ultrasound applications High intensity ultrasound application constitutes a

way to intensify many food processes However the efficient generation and application of ultrasound is essential to achieving a successful effect This part of the book will begin with a chapter dealing with the importance of the design of efficient ultrasonic application systems The medium is essential to achieve efficient transmission and for that reason the particular challenges of applying ultrasound in different media will be addressed The next part of this section constitutes an up to date vision of the use of high intensity ultrasound in food processes The chapters will be divided into four sections according to the medium in which the ultrasound vibration is transmitted from the transducers to the product being treated Thus solid liquid supercritical and gas media have been used for ultrasound propagation Previous books addressing ultrasonic applications in food processing have been based on the process itself so chapters have been divided in mass and heat transport microbial inactivation etc This new book will propose a revolutionary overview of ultrasonic applications based on in the authors opinion the most relevant factor affecting the efficiency of ultrasound applications the medium in which ultrasound is propagated Depending on the medium ultrasonic phenomena can be completely different but it also affects the complexity of the ultrasonic generation propagation and application In addition the effect of high intensity ultrasound on major components of food such as proteins carbohydrates and lipids will be also covered since this type of information has not been deeply studied in previous books Other aspects related to the challenges of food industry to incorporate ultrasound devices will be also considered This point is also very important since in the last few years researchers have made huge efforts to integrate fully automated and efficient ultrasound systems to the food production lines but in some cases it was not satisfactory In this sense it is necessary to identify and review the main related problems to efficiently produce and transmit ultrasound scale up reduce cost save energy and guarantee the production of safe healthy and high added value foods

Light Metals 2019 Corleen Chesonis, 2019-02-15 The Light Metals symposia at the TMS Annual Meeting Exhibition present the most recent developments discoveries and practices in primary aluminum science and technology The annual Light Metals volume has become the definitive reference in the field of aluminum production and related light metal technologies The 2019 collection includes papers from the following symposia 1 Alumina and Bauxite 2 Aluminum Alloys Processing and Characterization 3 Aluminum Reduction Technology 4 Cast Shop Technology 5 Cast Shop Technology Energy Joint Session 6 DGM TMS Symposium on Lightweight Metals 7 Electrode Technology for Aluminum Production 8 REWAS 2019 Cast Shop Recycling Technologies 9 Scandium Extraction and Use in Aluminum Alloys 10 Ultrasonic Processing of Liquid and Solidifying Alloys CRC Handbook of Engineering Tables Richard C. Dorf, 2003-11-24 The most important tables from every engineering discipline in one volume collected from the best most authoritative references in the business it s now more than wishful thinking The CRC Handbook of Engineering Tables makes it a reality The most frequently consulted tables and figures from CRC s acclaimed engineering handbooks are gathered tog CRC Handbook of Tables for Applied Engineering Science Ray E. Bolz, 1973-05-15 New tables in this edition cover lasers radiation cryogenics ultra sonics

semi conductors high vacuum techniques eutectic alloys and organic and inorganic surface coating Another major addition is expansion of the sections on engineering materials and composites with detailed indexing by name class and usage The special Index of Properties allows ready comparisons with respect to single property whether physical chemical electrical radiant mechanical or thermal The user of this book is assisted by a comprehensive index by cross references and by numerically keyed subject headings at the top of each page Each table is self explanatory with units abbreviations and symbols clearly defined and tabular material subdivided for easy reading

Sonochemistry Timothy J. Mason, Mircea Vinatoru, 2023-03-06 In the 1980 s sonochemistry was considered to be a rather restricted branch of chemistry involving the ways in which ultrasound could improve synthetic procedures predominantly in heterogeneous systems and particularly for organometallic reactions Within a few years the subject began to expand into other disciplines including food technology environmental protection and the extraction of natural materials Scientific interest grew and led to the formation of the European Society of Sonochemistry in 1990 and the launch of a new journal Ultrasonics Sonochemistry in 1994 The subject continues to develop as an exciting and multi disciplinary science with the participation of not only chemists but also physicists engineers and biologists The resulting cross fertilisation of ideas has led to the rapid growth of interdisciplinary research and provided an ideal way for young researchers to expand their knowledge and appreciation of the ways in which different sciences can interact It expands scientific knowledge through an opening of the closed doors that sometimes restrict the more specialist sciences The journey of exploration in sonochemistry and its expansion into new fields of science and engineering is recounted in *Sonochemistry Evolution and Expansion* written by two pioneers in the field It is unlike other texts about sonochemistry in that it follows the chronological developments in several very different applications of sonochemistry through the research experiences of the two authors Tim Mason and Mircea Vinatoru Designed for chemists and chemical engineers Written by two experts and practitioners in the subject Volume 1 covers the historical background and evolution of sonochemistry Volume 2 explains the wider applications and expansion of the subject **VOLUME 2 Applications and Developments** Volume 2 contains six chapters which detail the developments of sonochemistry in fields which continue to attract considerable research and development interest from academia and industry The topics range from the important developments in chemical synthesis through food technology and materials processing to therapeutic ultrasound The authors have made contributions to all of these and so the content is written in a way which should be understandable to readers whose expertise may not necessarily be in the individual topic Each of the applications and developments described help to illustrate not only the diverse nature of sonochemistry but also the unifying theme of the effects of acoustic cavitation on a wide range of procedures

ISOM 2013 Proceedings (GIAP Journals, India) Global Institutes Amritsar and University of Mauritius, *Aluminium Alloys* Jürgen Hirsch, Birgit Skrotzki, Günter Gottstein, 2008-11-17 Aluminium is a well established modern lightweight engineering and functional material with a unique

combination of specific properties like strength formability durability conductivity corrosion resistance etc It is present in many intelligent solutions in established markets like building transport packaging printing and many others in our fast moving modern society The various aluminium alloys can be processed quite efficiently in large quantities by conventional fabrication routes as well as in special sophisticated forms and material combinations for highly innovative high tech solutions and applications This book contains latest information about all these aspects in form of the refereed papers of the IIth International Conference on Aluminium Alloys ICAA where world wide experts from academia and engineers from industry present latest results and new ideas in fundamental as well as applied research Since 22 years the ICAA series provides scientists and engineers with a complete overview over the latest scientific and technological developments featuring profound technology based overviews and new innovative perspectives This book is a reference for the scientific community as well as for the aluminium industry working on aluminium alloy development processing and application issues It gives a global perspective on the current focus of international research with emphasis on in depth understanding of specific properties and applications of conventional and advanced aluminium alloys

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Highintensity Ultrasonics Theory And Industrial Applications Introduction

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