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selected, peer reviewed papers from the 2014 International Conference on Sensors and Materials Manufacturing Science (ICSMMS 2014), April 11-12, 2014, Hangzhou, China. The 84 papers are grouped as follows: Chapter 1: Materials Science and Technology, Materials Manufacturing Processes, Chapter 2: Sensors, Detection, Measuring and Monitoring Technologies and Algorithms, Chapter 3: Applied Mechanics, Thermal and Dynamic Systems, Control and Numerical Simulation Applications, Chapter 4: Electronics and Power Development, Information Technology and Algorithms in Systems Applications, Chapter 5: Developments in Medical Technologies

Protective Thin Coatings Technology

Springer Nature

This book provides a cohesive overview of innovations, advances in processing and characterization, and applications for high entropy alloys (HEAs) in performance-critical and non-performance-critical sectors. It covers manufacturing and processing, advanced characterization and analysis techniques, and evaluation of mechanical and physical

properties. With chapters authored by a team of internationally renowned experts, the volume includes discussions on high entropy thermoelectric materials, corrosion and thermal behavior of HEAs, improving fracture resistance, fatigue properties and high tensile strength of HEAs, HEA films, and more. This work will be of interest to academics, scientists, engineers, technologists, and entrepreneurs working in the field of materials and metals development for advanced applications. Features Addresses a broad spectrum of HEAs and related aspects, including manufacturing , processing, characterizati on, and properties Emphasizes the application of HEAs Aimed at researchers, engineers, and scientists working to develop materials for advanced applications T.S. Srivatsan, PhD, Professor of Materials Science and Engineering in the Department of Mechanical Engineering at the University of Akron (Ohio, USA), earned his MS in Aerospace Engineering in 1981 and his PhD in Mechanical Engineering in 1984 from the Georgia Institute of Technology (USA). He has authored or edited 65 books, delivered over 200 technical

presentations, and authored or co-authored more than 700 archival publications in journals, book chapters, book reviews, proceedings of conferences, and technical reports. His RG score is 45 with a h-index of 53 and Google Scholar citations of 9000, ranking him to be among the top 2% of researchers in the world. He is a Fellow of (i) the American Society for Materials International, (ii) the American Society of Mechanical Engineers, and (iii) the American Association for Advancement of Science. Manoj Gupta, PhD, is Associate Professor of Materials at NUS, Singapore. He is a former Head of Materials Division of the Mechanical Engineering Department and Director Designate of Materials Science and Engineering Initiative at NUS, Singapore. In August 2017, he was highlighted among the Top 1% Scientists of the World by the Universal Scientific Education and Research Network and in the Top 2.5% among scientists as per ResearchGate. In 2018, he was announced as World Academy Championship Winner in the area of Biomedical Sciences by the International Agency for Standards and Ratings. A multiple

award winner, he actively collaborates/visits as an invited researcher and visiting and chair professor in Japan, France, Saudi Arabia, Qatar, China, the United States, and India.

Materials Research, Exotic Properties and Applications

Springer Leadership in gas turbine technologies is of continuing importance as the value of gas turbine production is projected to grow substantially by 2030 and beyond. Power generation, aviation, and the oil and gas industries rely on advanced technologies for gas turbines. Market trends including world demographics, energy security and resilience, decarbonization, and customer profiles are rapidly changing and influencing the future of these industries and gas turbine technologies. Technology trends that define the technological environment in which gas turbine research and development will take place are also changing - including inexpensive, large scale computational capabilities, highly autonomous systems, additive manufacturing, and cybersecurity. It is important to evaluate how these changes influence the gas turbine industry and how to manage these

changes moving forward. Advanced Technologies for Gas Turbines identifies high-priority opportunities for improving and creating advanced technologies that can be introduced into the design and manufacture of gas turbines to enhance their performance. The goals of this report are to assess the 2030 gas turbine global landscape via analysis of global leadership, market trends, and technology trends that impact gas turbine applications, develop a prioritization process, define high-priority research goals, identify high-priority research areas and topics to achieve the specified goals, and direct future research. Findings and recommendations from this report are important in guiding research within the gas turbine industry and advancing electrical power generation, commercial and military aviation, and oil and gas production. *Challenges and Prospects* Elsevier Nothing provided *Joining Processes for Dissimilar and Advanced Materials* IGI Global This special issue in Modern Physics Letters B covers the latest research in advanced materials such as design,

synthesis and development of new materials, processing technology for new materials, and modeling and simulation of materials processing.

High Entropy Alloys

Frontiers Media SA

Many important advances in technology have been associated with nanotechnology and the miniaturization of components, devices and systems. Microjoining has been closely associated with the evolution of microelectronic packaging, but actually covers a much broader area, and is essential for manufacturing many electronic, precision and medical products. Part one reviews the basics of microjoining, including solid-state bonding and fusion microwelding. Part two covers microjoining and nanojoining processes, such as bonding mechanisms and metallurgy, process development and optimization, thermal stresses and distortion, positioning and fixturing, sensing, and numerical modelling. Part three discusses microjoining of materials such as plastics, ceramics, metals and advanced materials such as shape memory alloys and nanomaterials. The book also discusses applications of

microjoining such as joining superconductors, the manufacture of medical devices and the sealing of solid oxide fuel cells. This book provides a comprehensive overview of the fundamental aspects of microjoining processes and techniques. It is a valuable reference for production engineers, designers and researchers using or studying microjoining technologies in such industries as microelectronics and biomedical engineering. Reviews the basics of nanojoining including solid-state bonding and fusion microwelding Covers microjoining and nanojoining processes such as bonding mechanisms and metallurgy, sensing and numerical modelling Examines applications of microjoining such as the manufacturing of medical devices, and the sealing of solid oxide fuel cells

Engineering Steels and High Entropy-Alloys

Springer

This book provides a complete review of the current state of the art in the field of high entropy alloys (HEA). The conventional approach to alloy design is to select one principal element and add elements to it in minor quantities in order to improve the properties. In 2004,

Professor J.W. Yeh and his group first reported a new approach to alloy design, which involved mixing elements in equiatomic or near-equiatomic proportions, to form multi-component alloys with no single principal element. These alloys are expected to have high configurational entropy and hence were termed as "high entropy alloys." HEAs have a broad range of structures and properties, and may find applications in structural, electrical, magnetic, high-temperature, wear-resistant, corrosion-resistant, and oxidation-resistant components. Due to their unique properties, high entropy alloys have attracted considerable attention from both academics and technologists. This book presents the fundamental knowledge present in the field, the spectrum of various alloy systems and their characteristics studied to date, current key focus areas, and the future scope of the field in terms of research and technological applications. Encompasses the synthesis and phase formation of high entropy alloys Covers design of HEAs based on thermodynamic criteria Discusses the structural and functional properties of HEAs Provides

a comparison of HEAs with other multicomponent systems like intermetallics and bulk metallic glasses

High Entropy Alloys Trans Tech Publications Ltd

These papers present advancements in all aspects of high temperature electrochemistry, from the fundamental to the empirical and from the theoretical to the applied. Topics involving the application of electrochemistry to the nuclear fuel cycle, chemical sensors, energy storage, materials synthesis, refractory metals and their alloys, and alkali and alkaline earth metals are included. Also included are papers that discuss various technical, economic, and environmental issues associated with plant operations and industrial practices.

Ultrafine-grained Titanium and High-entropy Alloys Springer

Manufacturing Techniques for Materials: Engineering and Engineered provides a cohesive and comprehensive overview of the following: (i) prevailing and emerging trends, (ii) emerging developments and related technology, and (iii) potential for the commercialization of techniques specific to manufacturing of materials. The first half

of the book provides the interested reader with detailed chapters specific to the manufacturing of emerging materials, such as additive manufacturing , with a valued emphasis on the science, technology, and potentially viable practices specific to the manufacturing technique used. This section also attempts to discuss in a lucid and easily understandable manner the specific advantages and limitations of each technique and goes on to highlight all of the potentially viable and emerging technological applications. The second half of this archival volume focuses on a wide spectrum of conventional techniques currently available and being used in the manufacturing of both materials and resultant products. Manufacturing Techniques for Materials is an invaluable tool for a cross-section of readers including engineers, researchers, technologists, students at both the graduate level and undergraduate level, and even entrepreneurs .

New Materials, Applications and Processes

Springer Nature

Machine learning methods have lowered the cost of exploring new structures of

unknown compounds, and can be used to predict reasonable expectations and subsequently validated by experimental results. As new insights and several elaborative tools have been developed for materials science and engineering in recent years, it is an appropriate time to present a book covering recent progress in this field. Searchable and interactive databases can promote research on emerging materials. Recently, databases containing a large number of high-quality materials properties for new advanced materials discovery have been developed. These approaches are set to make a significant impact on human life and, with numerous commercial developments emerging, will become a major academic topic in the coming years. This authoritative and comprehensive book will be of interest to both existing researchers in this field as well as others in the materials science community who wish to take advantage of these powerful techniques. The book offers a global spread of authors, from USA, Canada, UK, Japan, France, Russia, China and

Singapore, who are all world recognized experts in their separate areas. With content relevant to both academic and commercial points of view, and offering an accessible overview of recent progress and potential future directions, the book will interest graduate students, postgraduate researchers, and consultants and industrial engineers.

A Brief Introduction

CRC Press Collection of selected, peer reviewed papers from the Modern Technologies in Industrial Engineering, July 13-16, Gliwice, Poland. The 189 papers are grouped as follows: Chapter 1: Applied Materials and Technologies, Chapter 2: Tools and Technologies for Materials Processing, Chapter 3: Parts and Components of Industrial Equipments, Chapter 4: Industrial Robotics, Chapter 5: Flexible and Integrated Manufacturing Systems, Chapter 6: Maritime Engineering and Technologies, Chapter 7: Modern Technologies in Product Design, Chapter 8: Engineering Management of Manufacturing Systems.

Advanced Technologies for Gas Turbines

High-Entropy Alloys Materials Under Extreme Conditions:

Recent Trends and Future Prospects analyzes the chemical transformation and decomposition of materials exposed to extreme conditions, such as high temperature, high pressure, hostile chemical environments, high radiation fields, high vacuum, high magnetic and electric fields, wear and abrasion related to chemical bonding, special crystallographic features, and microstructures. The materials covered in this work encompass oxides, non-oxides, alloys and intermetallics, glasses, and carbon-based materials. The book is written for researchers in academia and industry, and technologists in chemical engineering, materials chemistry, chemistry, and condensed matter physics. Describes and analyzes the chemical transformation and decomposition of a wide range of materials exposed to extreme conditions Brings together information currently scattered across the Internet or incoherently dispersed amongst journals and proceedings Presents chapters on phenomena, materials synthesis, and processing, characterization and properties, and applications Written by

established researchers in the field
High-Entropy Alloys
Springer
This book discusses fundamental studies involving the history, modelling, simulation, experimental work, and applications on high-entropy materials. Topics include data-driven and machine-learning approaches, additive-manufacturing techniques, computational and analytical methods, such as density functional theory and multifractal analysis, mechanical behavior, high-throughput methods, and irradiation effects. The types of high-entropy materials consist of alloys, oxides, and ceramics. The book then concludes with a discussion on potential future applications of these novel materials. Includes both experimental and theoretical approaches for fundamental understanding of the behavior of high-entropy materials Discusses interesting and innovative approaches to studying various phenomena, such as machine learning, additive manufacturing , mechanical behavior, high-throughput techniques, and irradiation effects in high-entropy materials Facilitates the applications of high-entropy materials Provides an

accessible reference for a broad audience of both academic, national laboratory, and industrial experts.

New Advances in High-Entropy Alloys The Electrochemical Society

High-Entropy AlloysElsevier

The Sixteenth Annual Conference YUCOMAT 2014 Butterworth-Heinemann

This book provides a systematic and comprehensive description of high-entropy alloys (HEAs). The authors summarize key properties of HEAs from the perspective of both fundamental understanding and applications, which are supported by in-depth analyses. The book also contains computational modeling in tackling HEAs, which help elucidate the formation mechanisms and properties of HEAs from various length and time scales.

Proceedings of Chinese Materials Conference 2017 Springer Nature

High-entropy alloys (HEAs) are a new class of materials attracting attention from researchers all over the world. This book provides a comprehensive overview of the research on HEAs, as well as discusses the mechanical, physical, and chemical properties of new HEAs and their potential applications. Chapters

cover such topics as HEA superconductors, HEA composites, high-entropy superalloys, artificial intelligence in HEA design, and more.

Machine Vision and Navigation

Trans Tech Publications Ltd

This book presents select proceedings of the International Conference on Future Learning Aspects of Mechanical Engineering (FLAME 2020). This book, in particular, focuses on characterizing materials using novel techniques. It covers a variety of advanced materials, viz. composites, coatings, nanomaterials, materials for fuel cells, biomaterials among others. The book also discusses advanced characterization techniques like X-ray photoelectron, UV spectroscopy, scanning electron, atomic power, transmission electron and laser confocal scanning fluorescence microscopy, and gel electrophoresis chromatography. This book gives the readers an insight into advanced material processes and characterizations with special emphasis on nanotechnology.

Materials Under Extreme Conditions

Springer Nature

This book provides an overview of high entropy alloys, explaining all the basics of

this new class of materials that emerged at the beginning of the 21st: It begins with the basics of the manufacturing methods of high entropy alloys and discusses the mechanical properties and deformation mechanisms of high entropy alloys. Then the book addresses the stability of these alloys and explores the prospects of high entropy alloys for applications.This book is intended as an introduction for physicists and materials scientists who need to become familiar with high entropy alloys.

Dual-phase Materials in the Medium and High Entropy Alloy Systems Al-Cr-Fe-Ni and Al-Co-Cr-Fe-Ni

Elsevier

Dynamic deformation occurs when bodies are subjected to rapidly changing loads and can differ significantly from deformation that occurs under static or quasi-static situations. It is of great significance to understand the deformation and failure mechanisms of advanced materials, and there are potential applications in which dynamic deformation and failure can occur. Two classes of advanced materials, ultrafine-grained (UFG) (~500 nm and ~100 nm) titanium and high-entropy alloys (HEAs) (Al0.3CoCrFeNi and

CoCrFeMnNi) are the focus of this doctoral investigation. The deformation and adiabatic shear localization at cryogenic temperatures (173 K and 77 K) in ultrafine-grained (100 and 500 nm) titanium are investigated. In comparison with conventionally -grained titanium, the strength of ultrafine-grained titanium is higher due to the classic Hall-Petch effect while the strain-hardening rate approaches zero. Our results show that shear localization in dynamic deformation is also altered. The width of the shear band of coarse-grained titanium decreases from 30 [mu]m at 293 K to 18 [mu]m at 77 K (a 40% decrease). In contrast, for 100 nm titanium, the width of shear band decreases more significantly from 4 [mu]m at room temperature to 1 [mu]m (a 75% decrease) at cryogenic temperature (77 K). This difference is attributed to the combined effects of a decrease in the thermal conductivity and the specific heat capacity, and an increase in the thermal softening, which can lead to a band with thickness of 1 [mu]m. These changes agree with the predictions of the Grady and Bai-Dodd theories. The dislocation evolution and

the subgrain rotation mechanisms responsible for forming ultrafine- and nano-recrystallized grains are modeled. In addition, the Zener-Hollomon parameter is incorporated in the analysis to predict the critical dislocation density for shear localization and the recrystallized grain size in titanium . The mechanical behavior of three single-phase face-centered-cubic (fcc) Al0.3CoCrFeNi , annealed CoCrFeMnNi and as-processed CoCrFeMnNi high-entropy alloys (HEAs) was studied in both quasi-static and high strain-rate regimes. Based on Hall-Petch strengthening, solid-solution strengthening, order hardening, cutting forest dislocations, and twinning hardening mechanisms, a constitutive equation was proposed to describe the flow of the annealed CoCrFeMnNi high-entropy alloy under dynamic impact. The resistance to shear localization is being established by dynamically-loading hat-shaped specimens that induce forced shear localization. Adiabatic shear band formation required an imposed shear strain of ~7 for the annealed CoCrFeMnNi HEA and cannot be observed at a strain of 1.1 for the Al0.3CoCrFeNi HEA. The

structural and mechanical response that give rise to a remarkable resistance to shear localization are characterized by a combination of (1) a high strain-hardening ability, enabled by solid solution hardening, forest dislocation hardening, order hardening, and twinning hardening, (2) a high strain-rate sensitivity and (3) modest thermal softening; these combination effects give rise to the remarkable resistance to shear localization. First, the low stacking-fault energies in as-received high-entropy alloys lead to the formation of twinned segments inside the coarse grains. Then, when the thermal softening overcomes strain hardening, the shear bands would form, and dynamic recrystallizatio n occurs inside the segments for the further break-up of the grains. Classical Straker equation is applied to predict the critical shear strain for shear localization, which was quite comparable to the experimental values in the high-entropy alloys. It was revealed that the as-processed CoCrFeMnNi HEA was prone to shear localization due to the initially high dislocation density which results in a

relatively low work-hardening effect. The dynamic deformation of these two metallic materials leads to adiabatic shear band formation at extreme shear strains. The resultant of the ultrafine grain structure observed in these two materials with diverse structures (HCP for Ti and FCC for HEAs) is remarkably similar and reinforces the concept of rotational dynamic recrystallization as the mechanism responsible for localization.

Progress in Materials Science and Engineering: ICMSE 2013

BoD – Books on Demand

This is the first comprehensive book to address in-situ mechanics approach, which relies on real-time imaging during mechanical measurements of materials. The book presents tools, techniques and methods to interrogate the deformation characteristics of a wide array of material classes, and how the mechanics and the material microstructures are correlated. In-situ approach provides unprecedented ability to decipher the mechanical behavior of materials from atomic length scales all the way up to bulk-scale, which is not possible using conventional means. The book also addresses how to

capture the deformation behavior of materials under different stress-states and extreme environments. The book will be useful to the new generation of students, scientists and researchers working on the frontiers of material design and innovation as they aim to develop new materials with predictable mechanical properties and technological applications. This book can also serve as a textbook aimed at upper-level undergraduates and graduate-level students who are beginning to delve into the mechanics of materials. Catering to a generation of students that appreciates videos as a didactic tool, this book contains numerous videos to supplement problems, solutions, and case studies.

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