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Welcome

Foundations of Materials Science and Engineering (FoMSE) is the successor serial of the former Materials Science Foundations (monograph series).

Each volume in this periodical is dedicated to one special topic from the area of theoretical research or practice of use of modern materials, technology of their production, research and modification of their properties, and all kinds of engineering research.

The Series counts to date more than 100 volumes devoted to many different topics and comprises in total over 20,000 pages of high-quality research being of particular interest and relevance for a wide range of scientists and engineers in the field of materials science and engineering.

This series started its first volume on Alloys in 1997 and publishes 2-5 new volumes per year. All volumes can be found in this catalogue which is updated regularly.

The volumes are available in print as well as e-book formats and both are also available in "bulk" as a serial purchase with access to all volumes. For every title from the series, individual/single title purchase is enabled.

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**Anne-Kristin Wohlbier,
CEO**



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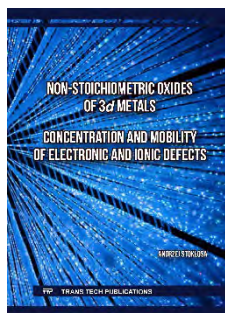
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Non-Stoichiometric Oxides of 3d Metals. Concentration and Mobility of Electronic and Ionic Defects.

Volume in the series: 105

Edited by: Andrzej Stokłosa

The advancement of material engineering over the last few decades has allowed for the development of modern metallic and ceramic construction materials, composites, nanomaterials and various kinds of coatings with desired performance characteristics. They form the basis for the development of the automotive industry, the aviation industry, the chemical equipment industry, etc. They can function in ever higher temperatures and aggressive environments. On the other hand, the advancement of electronics requires the development of new and cheaper materials: semiconductors, insulators, materials with magnetic, ferrimagnetic or piezoelectric properties, etc. The desired properties of materials or their surface layers depend on chemical composition, dopants, and the concentration of point defects, through which the transport of ions and electrons takes place. The functional properties also depend on the nuances of production technologies which allow to obtain a specific texture and a desired concentration of ionic and electronic point defects. The monograph follows up on the issues related to the concentration of charge carriers in pure and doped oxides. Based on the diagrams of the concentration of point defects, the calculation results of the concentration of charge carriers and their mobility are presented, using the results of the studies on the electrical conductivity and the thermoelectric power in some specific oxides of 3d metals. In turn, the results of calculations of the ionic defect diffusion coefficients, conducted using the coefficients of self-diffusion and chemical diffusion as well as the concentration of ionic defects in these oxides, are presented. The given material will be useful to a wide range of researchers and developers of new materials with a wide range of required properties.

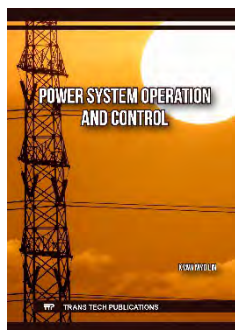
Topics: Materials Science, Nanoscience

Keywords: 3d Metals, Chemical Diffusion, Co1-80, Cu2-80, Defect Diffusion Coefficients, Deviation from Stoichiometry, Diagram of the Concentrations of Point Defects, Electrical Conductivity, Electronic and Ionic Defects, Fe1-80, Material Science, Mn1-80, Mobility, Ni1-80, Non-Stoichiometric Oxides, Self-Diffusion, Thermoelectric Power, TiO2-8, YBa2Cu3O6+8

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Print: 978-3-0364-0542-1
 eBook: 978-3-0364-1542-0
 486 pages, 2024

<https://www.scientific.net/978-3-0364-0542-1/book>



Power System Operation and Control

Volume in the series: 104

Edited by: Kyaw Myo Lin

The presented publication will be useful not only to everyone who is just studying the principles and methods of organizing modern energy supply but also to specialists in power engineering as a short guide or reference. All the material in the presented publication is presented by the author in an accessible form, with a sufficient number of illustrations, appropriate programs for computer modelling and tasks for self-testing of knowledge. This edition undoubtedly will be popular with readers whose activity is related to the operation of power systems.

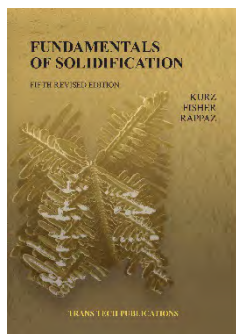
Topics: General Engineering, Industrial Engineering, Manufacturing, Mechanical Engineering

Keywords: Power System Operation, Economic Load Dispatch, Hydro-Thermal Scheduling, Unit Commitment, Power System Control, Load Frequency Control, Automatic Generation Control, Reactive Power Control, Power System Security, State Estimation

Prices: Print: **US\$ 250.00/ EUR 250.00**
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 270 pages, 2024

<https://www.scientific.net/978-3-0364-0440-0/book>



Fundamentals of Solidification 5th Edition

Volume in the series: 103

Edited by: Prof. Wilfried Kurz, Dr. David J. Fisher and Prof. Michel Rappaz

Since the 4th 1998 edition, there have been numerous crucial advances to the modelling and the basic understanding of solidification phenomena, and with its linking to experimental results. These topics have been incorporated into this 5th Fully Revised Edition, as well as a new final chapter on microstructure selection which explains how to combine the concepts of the preceding chapters for modelling real microstructures, in complex processes such as additive manufacturing.

This new 5th edition is of high interest to undergraduate and graduate levels and professionals. For orders you are welcome to download the [Order Form](#).

With its numerous new topics - also borne out by the new authorship - students and teachers, scientists and engineers will greatly benefit from this new book. The topics are presented in the same praised manner as in previous editions, readable at three levels:

- an initial feel for the subject is obtained by consulting the figures and their detailed captions;
- a deeper understanding of the underlying physics is found by working through the main text;
- 15 appendices offer a detailed analysis of the various theories, by providing detailed derivations of the relevant equations.

Particularly Novel: the final chapter 8 on *microstructure-selection* explains how to combine the concepts of the preceding chapters to model the real microstructures formed during complex processes such as additive manufacturing, and the new detailed *phase-field* appendix which opens the door to the accurate computer-modelling of growth-forms.

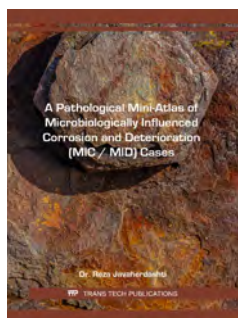
This book has a companion book [Solutions Manual](#) which is available separately.

Topics: Materials Science

Keywords: Alloy Dendrite, Cast Iron (Fe-C), Cellular Interface, Columnar Dendrite, Columnar Zone, Concentration Gradient, Constitutional Undercooling, Cooling Rate, Curvature, Curvature Undercooling, Dendrite Growth Rate, Dendrite Spacing, Dendrite Tip, Dendrite Tip Radius, Diffuse Interface, Diffusion Coefficient, Diffusion Coupled Growth, Diffusion in Liquids, Diffusion Length, Directional Growth, Distribution Coefficient, Equiaxed Dendrite, Eutectic Al-Si, Extremum Growth Criterion, Fluid Flow, Flux Balance, Gibbs Free Energy, Gibbs-Thomson Effect, Growth Defects, Heat Flux, Interface Curvature, Interface Perturbation, Lever Rule, Local Equilibrium, Mass Balance, Microscopic Solvability, Non-Faceted Interface, Nucleation Critical Radius, Nucleation Rate, Nucleation Undercooling, Phase Diagram, Rapid Solidification, Solute Boundary Layer, Steady State, Steady-State Solidification, Temperature Gradient, Volume Fraction Eutectic

Prices: Print: **US\$ 49.50/ EUR 49.50** Print: 978-3-0364-0015-0
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<https://www.scientific.net/978-3-0364-0015-0/book>



A Pathological Mini-Atlas of Microbiologically Influenced Corrosion and Deterioration (MIC / MID) Cases

Volume in the series: 102

Edited by: Dr. Reza Javaherdashti

"A Pathological Mini-Atlas of Microbiologically Influenced Corrosion and Deterioration (MIC/MID) cases", authored and edited by Dr. Reza Javaherdashti, is a book that, in collaboration with several international world-known MIC professionals, has been written to shed light on some areas of MIC/MID that are still in the dark as well as designing a new systematic insight into the study of MIC/MID phenomena.

Topics: Materials Science, Mechanical Engineering, Mechanics

Keywords: Antifouling, Anti-Microbial Coating, Biocide (Oxidising, Non-Oxidising/Organic), Biofilm, Black Mould, Bottom-of-the Line (BOL), Cathodic Depolarisation Theory (CDT), Corrosion Modelling, Corrosion Risk, Corrosion System, Culture Dependent Methods, Culture Independent Methods, Disbonded or Damaged Coatings, EMIC (Electrical MIC), Encapsulation, Exopolymer Substances (EPS), External Electron Transfer (EET), Fick's Second Law, Flagella, Fouling, Fuzzy Calculus, Gliding and Twitching, Hydrophilicity, Hydrophobicity, Iron Reducing Bacteria (IRB), Key Performance Indicator (KPI), Microbial Corrosion, Microbial Succession, Microbiologically Influenced Corrosion (MIC), Microbiologically Influenced Deterioration (MID), Pipeline Inspection Gauge (PIG), Planktonic Bacteria, Re-Growth, Root Cause Analysis, Sessile Bacteria, Solid Phase Dwelling (SPD) Bacteria, Stress Corrosion Cracking (SCC), Sulfate Reducing Bacteria (SRB), Sulphur Oxidising Bacteria (SOB), Sulphureta, Symbiosis, Syntrophy, Temenos, TRIZ, Tubercle, Volatile Organic Compounds Levels (VOC), Wetting

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<https://www.scientific.net/978-3-0364-0017-4/book>



Leagile Supply Chain Strategy in Asian Automotive Production

Volume in the series: 101

Edited by: Dr. Syed Abdul Rehman Khan, Dr. Adeel Shah and Dr. Zhang Yu

The leagile strategy is the symbiosis of lean and agile strategies in the modern supply chain management practice. The leagile approach implements the objective paradigm of meeting customer demands at the least total cost, providing greater competitiveness in today's realities.

In the presented research, the authors, based on an assessment of the current state of automotive production in Asia, propose and analyse a model of leagile strategy for supply chain management for the mentioned sector of the Asian economy. The edition will be helpful and exciting for readers whose activity is related to supply chain management practice.

Topics: Industrial Engineering, Manufacturing

Keywords: Asian Automotive Industry, Leagile Strategy, Supply Chain Management

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High-Tech Industry Development during Global Pandemic: Case Study of South Korea

Volume in the series: 100

Edited by: Prof. Olga Shvetsova

The impact of the COVID-19 pandemic on the functioning and development of certain branches of industrial production is subject to detailed analysis taking into account the national and cultural specifics of a particular region, the degree of development of the national economy as a whole, anti-pandemic actions of governments, etc. Such an analysis will make it possible to outline a range of effective measures to counter the negative impact of the pandemic on the economy and develop a program for post-pandemic recovery of production. The monograph by Prof. Olga Shvetsova (Korea University of Technology and Education) is a striking example, a successful attempt at such an analysis on the example of the High-Tech Industry of South Korea.

Topics: Industrial Engineering, Information Technologies, Manufacturing

Keywords: Change Management, COVID-19, Global Pandemic, High-Tech Industry, Innovation Environment, South Korea

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eBook Multi-User: **US\$ 173.00/ EUR 173.00** 68 pages, 2022

<https://www.scientific.net/978-3-0357-1564-4/book>



Clinical Efficiency of Materials and Technologies for Fixed Prosthodontics

Volume in the series: 99

Edited by: Dr. Dejan Drakul

The monograph "Clinical Efficiency of Materials and Technologies for Fixed Prosthodontics" is dedicated to elucidation of essential notions from the area of the Fixed prosthodontics. It deals with cast metal post and core systems, fiber-reinforced polymer post systems, metal-ceramic technology, all-ceramic systems, etc. It describes basic clinical and laboratory procedures involved in the manufacturing of these dental prostheses. It should serve as a guide for further research in any of the given areas described, and a manual for the most essential principles and concepts in the given subdiscipline of the Medical dentistry.

Topics: Bioscience and Medicine, Materials Science, Mechanics

Keywords: Alloy, Artificial Crown, Ceramics, Clinical Efficiency, Dental Bridge, Fixed Prosthodontics, Metal, Metal Ceramics, Properties, Zirconia

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eBook Multi-User: **US\$ 347.00/ EUR 347.00** 212 pages, 2021

<https://www.scientific.net/978-3-0357-1626-9/book>



Physical and Chemical Properties of Dental Restorative Materials that Affect their Clinical Efficiency

Volume in the series: 98

Edited by: Dr. Dejan Drakul

The work at hand deals with restorative dental materials that are being used for the treatment of the most common dental disease – dental caries (but for treatment of cuneiform erosions as well). The materials this work talks about are dental amalgams (metallic dental restorative material), dental resin composites, and glass-ionomer cements. This work looks at these materials from the perspective of their physical and chemical properties that influence the clinical efficiency of these materials (the quality of restorations).

Topics: Bioscience and Medicine

Keywords: Chemical Properties, Clinical Efficiency of Dental Restorative Materials, Dental Amalgams, Dental Resin Composites, Glass Ionomer Cements, Physical Properties

Prices: Print: **US\$ 86.00/ EUR 86.00** Print: 978-3-0357-1798-3
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Studies on Conversion of FA's and FFA's to Alkyl Esters Using WCO's of Different Origin

Volume in the series: 97

Edited by: Dr. Susarla Venkata Ananta Rama Sastry and Prof. K.V. Rao

This study examines the biodiesel production from waste cooking oils of different origin by conversion of fatty acids and free fatty acids to alkyl esters.

Topics: Bioscience and Medicine, Manufacturing, Materials Science

Keywords: Alkyl Esters, Biodiesel, Conversion, Fatty Acid, Free Fatty Acids, Waste Cooking Oil

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eBook Multi-User: **US\$ 280.00/ EUR 280.00** 80 pages, 2019

<https://www.scientific.net/978-3-0357-1572-9/book>



The Dislocation-Particle Analogy and Plasma-Crystal Models

Volume in the series: 96

Edited by: Dr. David Fisher

The present monograph focuses on the very fruitful method of equating particle-physics phenomena - where the speed of light is a key factor – to dislocation-motion in solids – where the speed of sound plays an analogous role. The so-called 'dusty plasma' has proved to be a very useful substitute and its use confirms that the particle/dislocation analogy is well-founded.

Topics: Materials Science

Keywords: Argument by Analogy, Attraction-Repulsion Reversal, Causality Paradox, Dislocation Interactions, Dislocation Velocity, Dusty Plasma, Frenkel-Kontorova Model, Photons, Plasma Crystal, Solutions, Sound Barrier, Special Relativity, Tachyons, Velocity of Light, 'Zero-Gravity' Experiments

Prices: Print: **US\$ 126.00/ EUR 126.00** Print: 978-3-0357-1471-5
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<https://www.scientific.net/978-3-0357-1471-5/book>



Defect-Mediated Degradation of Diffusion Barriers

Volume in the series: 95

Edited by: Dr. David Fisher

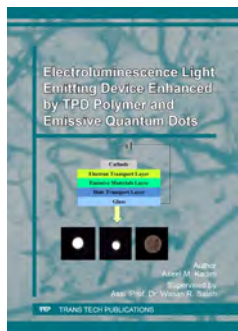
The wide practical use of the diffusion barrier phenomenon in the various areas of science and modern engineering is impossible without the studying of all aspects of their creation, functioning and degradation. The present monograph covers a specific and important aspect of the diffusion barriers damaging process - the deleterious effect of atomic-scale defects in the structure of diffusion barriers.

Topics: Materials Science, Nanoscience

Keywords: Atomic-Scale Defects, Coatings, Deposition, Diffusion, Diffusion Barriers, Diffusion Coefficient, Films, Layers

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<https://www.scientific.net/978-3-0357-1346-6/book>



Electroluminescence Light Emitting Device Enhanced by TPD Polymer and Emissive Quantum Dots

Volume in the series: 94

Edited by: Dr. Akeel M. Kadim

The monograph explores the features of white light generation by using the electroluminescent devices based on emissive quantum dots of cadmium selenide (CdSe), cadmium sulfide (CdS) and zinc sulfide (ZnS) with polymeric hole injection layer from Tetra-Phenyl Diaminobiphenyl (TPD) and polymethyl methacrylate (PMMA).

Topics: Electronics, Materials Science

Keywords: Electroluminescent Device, Intensity of Emission, Polymeric Hole Injection Layer, Quantum Dots, Recombination

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92 pages, 2017

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Materials Processing for Engineering Manufacture

Volume in the series: 93

Special topic volume with invited peer reviewed papers only

Edited by: Zainul Huda

"Manufacturing Technology and Materials Processing" is a core course for the undergraduate program: "Mechanical Engineering - Engineering Materials - Industrial Manufacture" in all reputed universities. This volume is designed for readers who are either engineering-degree students or practicing engineers in industry. This volume comprises of 19 chapters that are organized by dividing into four parts. Part I introduces to the Fundamentals of Materials and Manufacturing. Part II discusses Basic and Conventional Manufacturing Processes. Part III deals with Advanced Manufacturing Processes and Systems. Finally, in Part IV are explained Economic aspects and aspects of Quality Assurance of the manufacturing.

Topics: General Engineering

Keywords: Manufacturing Technologies, Materials, Materials Processing, Systems

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462 pages, 2016

<https://www.scientific.net/978-3-03835-721-6/book>



Membrane Fusion and Syncytial Neuronal Cytoplasmic Connection

Volume in the series: 92

Edited by: O.S. Sotnikov and A.A. Laktionova

In this monograph, for the first time, results of systematic studies of cytoplasmic syncytial connections in the vertebrate and invertebrate nervous system are presented. It has been shown that in the nervous system, apart from chemical synapses and electrical membranous contacts, the third type of interneuronal communications exists — the cytoplasmic syncytial connection. Absolute criteria are developed, which allow revealing syncytial connections in light microscopy preparations and in tissue culture plexuses, as well as in electron microscopy investigations. For the first time, the method of artificial syncytial fusion of mass of living neurons in experiment was developed. It was shown that neurons, like cells of all other types, are capable for the enucleation with formation of karyoplasts and cytoplasts. This book is of interest to neurophysiologists, neuromorphologists, and neuropathologists, as well as to lecturers in the corresponding general courses about the neuron.

Topics: Bioscience and Medicine

Keywords: Chemical Synapses, Cleft Contacts, Cytoplasmic Syncytial Connection, Cytoplasmic Syncytial Connections, Dilatation of Membranous Pores, Electrical Membranous Contacts, Large Membrane Perforations, Method of Artificial Syncytial Fusion of Mass of Living Neurons, Nervous System, Neurocytes, Neuromembranes, Syncytiums, Third Type of Interneuronal Communications

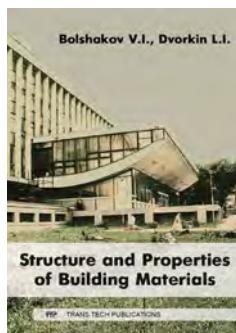
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eBook: 978-3-0357-3000-5

168 pages, 2016

<https://www.scientific.net/978-3-0357-1000-7/book>



Structure and Properties of Building Materials

Volume in the series: 91

Edited by: Bolshakov V.I., Dvorkin L.I.

This book is intended for a wide readership and mostly for specialists - builders, as well as graduate and undergraduate students of engineering sciences in universities. In this book the Authors outline the general statement of structural theory and consider on its basis the interrelations of structure and properties of major groups of building materials. By generalizing the data of numerous studies, the Authors refer to and analyze the results obtained by them in the Pridneprovsk Academy of Construction and Architecture and the National University of Water Management and Environmental Sciences (Ukraine).

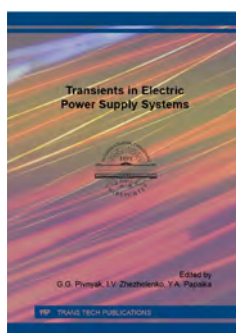
Topics: Building Materials, Mechanics

Keywords: Building, Construction, Materials, Structure

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Print: 978-3-03835-717-9
 eBook: 978-3-0357-0207-1
 220 pages, 2016

<https://www.scientific.net/978-3-03835-717-9/book>



Transients in Electric Power Supply Systems

Volume in the series: 90

Textbook for students of higher educational institutions

Edited by: Gennadiy Pivnyak, Igor V. Zhezhelenko and Yuriy Papaika

The book consists of introduction and two parts. In the first part electromagnetic transients caused by shorts, longitudinal and lateral asymmetry, technological process and conditions of electromagnetic compatibility are considered. The part two is devoted to electromechanical transients and to combined influence of the electromagnetic and electromechanical transients on power supply system operation stability.

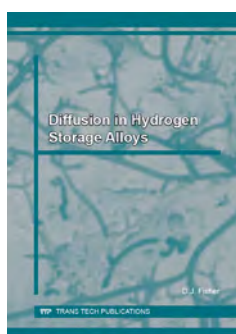
Topics: Industrial Engineering

Keywords: Electric Power, Supply Systems, Transients

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 eBook Multi-User: **US\$ 308.00/ EUR 308.00**

Print: 978-3-03835-773-5
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 392 pages, 2016

<https://www.scientific.net/978-3-03835-773-5/book>



Diffusion in Hydrogen Storage Alloys

Volume in the series: 89

Edited by: Dr. David Fisher

This volume presents a summary of relevant diffusion data. Enormous amount of research has been expended on the option of storing the hydrogen in solid metal alloys. The loading of metals with hydrogen, and its extraction, depends upon several processes. It is found that the slowest, and therefore the rate-determining process is hydrogen diffusion in the solid.

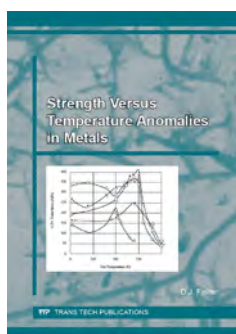
Topics: Materials Science, Mechanics

Keywords: Chromium-Based Alloys, Magnesium-Based Alloys, Manganese-Based Alloys, Nickel-Based Alloys, Titanium-Based Alloys, Vanadium-Based Alloys, Zirconium-Based Alloys

Prices: Print: **US\$ 152.00/ EUR 152.00**
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Print: 978-3-03835-990-6
 eBook: 978-3-0357-0106-7
 152 pages, 2015

<https://www.scientific.net/978-3-03835-990-6/book>



Strength Versus Temperature Anomalies in Metals

Volume in the series: 88

Edited by: Dr. David Fisher

Perhaps the best-known aspect of the behavior of metals, and indeed of most materials, is that they weaken with temperature. This weakening is however a problem in some applications. Only tungsten for instance, with its naturally high melting-point, was suitable for the manufacture of the filaments of incandescent light-bulbs. Even then, it was necessary to add oxide particles having a yet higher melting-point in order to prevent the weakening effect of grain-growth. These are alloys however which can be said to be weakened by heat, but nevertheless 'hang on' to enough strength to perform their task. The real boon would be an alloy which actually, as it were, 'rose to the occasion'. Such a class of alloy exists, and is the subject of this book. It brings together everything which is known about the yield strength anomaly; both theoretically and experimentally.

Topics: Materials Science, Mechanics

Keywords: Alloy, Materials Processing, Materials Survey, Mechanical Properties, Yield Stress

Prices: Print: **US\$ 158.00/ EUR 158.00**
 eBook Single-User: **US\$ 165.00/ EUR 165.00**
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Print: 978-3-03835-992-0
 eBook: 978-3-0357-0011-4
 158 pages, 2015

<https://www.scientific.net/978-3-03835-992-0/book>



Cluster Electric Spectroscopy of Colloid Chemical Oxyhydrate Systems

Volume in the series: 87

Edited by: Yu.I. Sucharev and I.Yu. Apalikova

This monograph deals with the shape of Liesegang operator and its respective phase diagrams of spontaneous surges and analyzed properties of cluster attractors. It describes the influence of pulsation noise or self-organization current of gel systems in a magnetic field on singularities of optic parameters of yttrium oxyhydrate, as well as on kinetic curves of changes in optic density of oxyhydrate systems, sorptive properties of d- and f-elements, and the structural organization of their colloids. This monograph is meant for postgraduate students, magisters, researchers, and those interested in solid-state chemistry and physics.

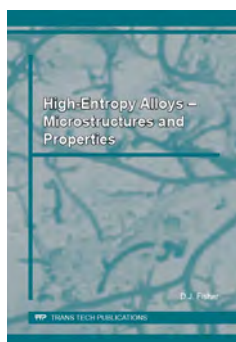
Topics: Materials Science

Keywords: Biomedical Application, Nanobioelectronics, Nanomaterials, Nanoparticles

Prices: Print: **US\$ 198.00/ EUR 198.00**
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eBook: 978-3-0357-0034-3
596 pages, 2015

<https://www.scientific.net/978-3-03835-991-3/book>



High-Entropy Alloys – Microstructures and Properties

Volume in the series: 86

Edited by: Dr. David Fisher

There are relatively few revolutions in the venerable and rather staid field of metallurgy. One can count among them the advent of metallic glasses, of superplastic metals, or of memory-alloys. The latest revolution involves the relatively staid topic of alloy formulation, but is all the more startling because the resultant materials break every long-cherished rule of alloy design. In particular, the famous empirical rules of Hume-Rothery are completely ignored. That is, in the archetypal high-entropy alloy, five metals are alloyed together in equal proportions regardless of atomic-size difference, valence or crystal structure. Commonsense would tell any experienced metallurgist that that could result only in a uselessly brittle mass of intermetallic compounds. But in a truly paradigm-shifting manner, Professor J.W.Yeh of Taiwan correctly predicted that a high configurational entropy could suppress the appearance of detrimental intermetallic compounds and lead to simple familiar microstructures having very useful properties. High-Entropy Alloys can exhibit, for instance, astounding hardness and strength and also have a very good corrosion resistance. The present book summarises the microstructures and properties of all of the high-entropy alloys.

Topics: Materials Science

Keywords: Alloy, Materials Processing, Mechanical Properties, Microstructure

Prices: Print: **US\$ 160.00/ EUR 160.00**
eBook Single-User: **US\$ 165.00/ EUR 165.00**
eBook Multi-User: **US\$ 289.00/ EUR 289.00**

Print: 978-3-03835-993-7
eBook: 978-3-03826-945-8
160 pages, 2015

<https://www.scientific.net/978-3-03835-993-7/book>



Formation of Silicon Nitride from the 19th to the 21st Century

Volume in the series: 84-85

Edited by: Raymond C. Sangster and Dr. David Fisher

The elements: Si, N, O, C and H, have strong chemical affinities for one another. Under the correct conditions, Si-N bonding will occur in almost any Si-N-(O/C/H), and many related, reaction systems; although Si-O and Si-C are formidable competitors to Si-N. The most favored Si-N compound is stoichiometric Si₃N₄. It comes in three common varieties. How they interrelate, how one finds them and (above all) how one makes them - and how sometimes they just happen to form - are the subjects of this book, with due attention being paid to closely related matters. This revised second edition summarizes and integrates what is recorded in the world literature from 1857 through 2014 as being known about the formation of silicon nitride - Si₃N₄ - and its close relatives. The book is the key to all that has been learned, over the past 150 years, about how silicon nitride comes to exist: in nature, in the laboratory or in the factory and in many reaction systems; together with how it is used in ceramics, electronic films, optical coatings and many other ways (including an introduction to closely related substances). It will aid the researcher in designing new projects, the supervisor in briefing new employees, the salesman in working with new customers, the patent attorney in assessing patents and the professor in designing graduate course assignments. This comprehensive reference gathers information published on the chemistry of silicon nitride and its products, uses, and markets. Separate chapters overview the manufacture of silicon nitride powder, the production of silicon nitride ceramics via the reaction bonding process, the intrinsic reactions between crystalline silicon surfaces and N₂ for silicon wafers, nitridation of Si-O based materials, and chemical vapor deposition of Si-H compounds.

Topics: Materials Science

Keywords: Formation of Silicon Nitride

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eBook Multi-User: **US\$ 347.00/ EUR 347.00**

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eBook: 978-3-03826-901-4
1016 pages, 2015

<https://www.scientific.net/978-3-03835-994-4/book>



Abrasive Blast Cleaning and Its Application

Volume in the series: 83

Edited by: Janette Brezinová, Anna Guzanová and Dagmar Draganovská

Blasting is currently the technology with significant application in practice with a variety of materials used as blasting media. The scientific-pedagogical team of Department of Mechanical Technology and Materials, Faculty of Mechanical Engineering, Technical University of Košice, Slovakia, focuses on the theoretical basics of blasting process in terms of cleaning and roughening effect focusing on wide range of metallic and non-metallic blasting media. The achieved results were obtained during the completion of a number of research tasks at different levels, completion of tasks for manufacturing practice as well as through dissertations and theses. Original findings contained in this monograph will contribute to expanding of the knowledge base of scientific researchers as well as to the transfer of the research results into practice. The monograph will serve as a source of scientific and technical information for scientific researchers, workers of technical institutes and the general scientific community.

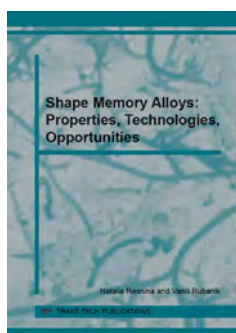
Topics: Materials Science, Mechanics

Keywords: Abrasive Blast Cleaning

Prices: Print: **US\$ 112.00/ EUR 112.00**
eBook Single-User: **US\$ 132.00/ EUR 132.00**
eBook Multi-User: **US\$ 231.00/ EUR 231.00**

Print: 978-3-03835-995-1
eBook: 978-3-03826-775-1
112 pages, 2015

<https://www.scientific.net/978-3-03835-995-1/book>



Shape Memory Alloys: Properties, Technologies, Opportunities

Volume in the series: 81-82

Special topic volume with invited peer reviewed papers only.

Edited by: Natalia Resnina and Vasili Rubanik

The collective monograph consists of five parts: Theory and modeling of martensitic transformation and functional properties; Martensitic transformations and shape memory effects; Controlling the functional properties of shape memory alloys; Shape memory alloys with complex structure; Application of shape memory alloys) covering of all aspects of shape memory alloys from theory and modelling to applications. It presents the scientific results obtained by leading scientific teams studying shape memory alloys in the former Soviet Republics together with their colleagues from other countries during the last decade.

Topics: Materials Science

Keywords: Amorphous-Crystalline Ribbons, Austenitic Steel, Biocompatible, Crystal-Chemical Factors, Dynamic Behaviour, Dynamic Model, Electroplastic Effect, Ferromagnetic Shape Memory Alloys, Heusler Alloys, High-Strength Single Crystals, High-Temperature Shape Memory Alloys, Microstructural Model, Minimally-Invasive Surgery, Monte Carlo Simulation, Nanocrystalline Shape Memory Alloys, Neutron Irradiation, Porous Shape Memory Alloys, Shape Memory Alloys, Shape Memory Effect, Spatial Model, Thermoelastic Martensitic Transformation, Thermomechanical Treatment, Thermosensitive Element, Ti-Nb Based Alloys, TiNi-Based Alloys, Ultrasonic Vibrations, Warm Abc Pressing

Prices: Print: **US\$ 319.00/ EUR 319.00**
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eBook Multi-User: **US\$ 347.00/ EUR 347.00**

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eBook: 978-3-03826-742-3
640 pages, 2015

<https://www.scientific.net/978-3-03835-357-7/book>



Reinforced Concrete Structures under Cyclic Loading

Volume in the series: 80

Edited by: Farhad Aslani

Experimental programs in laboratories give real results to identify nonlinear behavior of reinforced concrete (RC) structures but they are limited to knowledge of particular cases under restricted structural dimensions, sizes, shapes, loading and boundary conditions but the computational simulation approach has no limit to its application. Constitutive models are developed to simulate the dynamic nonlinear response of concrete and steel reinforcement subjected to cyclic loading varying randomly in magnitude. The behavior of structural concrete under monotonic loading is affected by important material aspects including cracking, crushing, tension stiffening, compression softening and bond slip. Reversed cyclic loading introduces further complexities such as stiffness degradation in concrete and the Bauschinger effect in reinforcing steel. In this research the validity and reliability of some proposed constitutive models for concrete considering general loading i.e. cyclic, monotonic, partial, common point and transition loading are evaluated. Comparisons with test results showed that the proposed model provides a good fit to a wide range of experimentally established hysteresis loops.

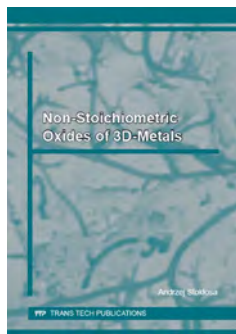
Topics: Materials Science, Mechanics

Keywords: Concrete Structures, Reinforced Concrete

Prices: Print: **US\$ 160.00/ EUR 160.00**
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eBook Multi-User: **US\$ 280.00/ EUR 280.00**

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eBook: 978-3-03826-723-2
284 pages, 2015

<https://www.scientific.net/978-3-03835-996-8/book>



Non-Stoichiometric Oxides of 3d-Metals

Volume in the series: 79

Edited by: Andrzej Stokłosa

In the present work, in Part I, new elements widening the bases of the defects theory are shown; particularly, this work discusses the mechanism of the formation of defects as a result of elementary processes; the work also presents a description of the equilibrium state by one equation, taking into account the concentrations of defects and their changes during the process of reaching the equilibrium. The equation relates the concentrations of defects, dependent on the standard Gibbs energies of their formation, with the equilibrium pressure of oxygen. The obtained relations and the discussion have lead to the development of a method for determination of complete diagrams of concentrations of the point defects, which allows taking into account the minority defects. Part II presents the results of the calculations of the diagrams of point defects' concentrations for a series of pure and doped oxides of transition metals 3d, with different composition (M/O ratio), crystallographic structure and point defects' structure. A critical analysis of the results of the studies of the deviation from the stoichiometry and the electrical conductivity, obtained (so far) by most research groups has been also performed. A new interpretation of these results, concerning concentrations and types of ionic defects present has been performed and the mobility of electronic defects and its dependence on the temperature and oxygen pressure have been determined.

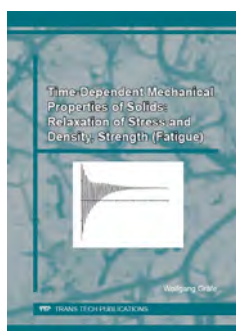
Topics: Materials Science

Keywords: 3d-Metals

Prices: Print: **US\$ 292.00/ EUR 292.00**
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eBook Multi-User: **US\$ 347.00/ EUR 347.00**

Print: 978-3-03835-997-5
eBook: 978-3-03826-608-2
590 pages, 2015

<https://www.scientific.net/978-3-03835-997-5/book>



Relaxation of Stress and Density, Strength (Fatigue)

Volume in the series: 78

Edited by: Wolfgang Gräfe

This treatment of "Time-Dependent Mechanical Properties of Solids" begins with a phenomenological description of the transport of some unspecified entity. It is assumed that the transport is caused by mechanical stresses or temperature fields. Using these assumptions, it is possible to deduce formulae for a theoretically based description of several phenomena without referring to any specific process or entity. These theoretical results then provide the tools for performing methodologically better scientific work and for a better analysis of data in the practical application of materials. By publishing this work, the author hopes to improve technical safety in transportation and other fields of practical materials application. Another goal is to stimulate the scientific investigation of a wider range of substances in order to analyze more extensively the elementary processes which produce observed phenomena. This second edition is extended and Chapter 12, five new Sections as well as the Appendices A7, A8 and A9 are additionally inserted.

Topics: Materials Science, Mechanics

Keywords: Creep, Defects, Fatigue, Relaxation in Materials, Stress in Materials

Prices: Print: **US\$ 160.00/ EUR 160.00**
eBook Single-User: **US\$ 160.00/ EUR 160.00**
eBook Multi-User: **US\$ 280.00/ EUR 280.00**

Print: 978-3-03835-998-2
eBook: 978-3-03826-502-3
206 pages, 2015

<https://www.scientific.net/978-3-03835-998-2/book>



Short-Term and Long-Term Behaviour of Reinforced Self-Compacting Concrete Structures

Volume in the series: 77

Edited by: Farhad Aslani

Volume is indexed by Thomson Reuters BCI (WoS).

Self-Compacting Concrete (SCC) refers to a 'highly flow-able, non-segregating concrete that can be spread into place, fill the formwork, and encapsulate the reinforcement without the aid of any mechanical consolidation. SCC is regarded as one of the most promising developments in concrete technology due to significant advantages over Conventional Concrete (CC). In this study, cracking caused by external loads in reinforced SCC and FRSCC slabs is examined experimentally and analytically. The mechanisms associated with the flexural cracking due to the combined effects of constant sustained service loads and shrinkage are observed. One of the primary objectives of this study is to develop analytical models that accurately predict the hardened mechanical properties of SCC and FRSCC. Subsequently, these models have been successfully applied to simulate time-dependent cracking of SCC and FRSCC one-way slabs.

Topics: Building Materials, Construction, Mechanics

Keywords: Concrete, Reinforced Concrete, Self-Compacting Concrete

Prices: Print: **US\$ 248.00/ EUR 248.00**
eBook Single-User: **US\$ 198.00/ EUR 198.00**
eBook Multi-User: **US\$ 347.00/ EUR 347.00**

Print: 978-3-03835-999-9
eBook: 978-3-03826-498-9
556 pages, 2014

<https://www.scientific.net/978-3-03835-999-9/book>



French Activity on High Temperature Corrosion in Water Vapor

Volume in the series: 76

Edited by: Sébastien Chevalier and Jérôme Favregeon

Increased clarity in our understanding of water vapor effects on oxidation is resulting from our recognition that multiple mechanisms are possible, and that distinctions must be drawn between situations where, on the one hand, molecular oxygen accompanies water vapor, and on the other, it does not, and instead free hydrogen can be present. It is a pleasure to welcome the contributions of this new book to this important field. Whilst the existence of a substantial French research effort in the area has been well known, the scale and extent of the effort comes as something of a surprise. The reason for this is apparent in the reference lists provided at the end of each chapter: much of the work is simply not available in the readily accessed literature. The book performs an important service in bringing these results to the attention of the wider research community. Overall, the book succeeds well in its aim of presenting an integrated view of water vapor effects on high temperature corrosion. Its organization into chapters concerned with different alloy classes is appealing, and the contents should prove useful to many readers.

Topics: Materials Science

Keywords: Chromium Volatilization, Electrical Conductivity, Growing Scale, High Temperature Corrosion, High Temperature Reactors, Oxidation Kinetics, Water Vapor

Prices: Print: **US\$ 165.00/ EUR 165.00**
eBook Single-User: **US\$ 165.00/ EUR 165.00**
eBook Multi-User: **US\$ 289.00/ EUR 289.00**

Print: 978-3-03785-996-4
eBook: 978-3-03826-382-1
206 pages, 2014

<https://www.scientific.net/978-3-03785-996-4/book>



Metal Science: Past, Present and Future

Volume in the series: 75

Edited by: G.S. Upadhyaya

Volume is indexed by Thomson Reuters BCI (WoS).

Metals, because of their inherent properties, have been in service to mankind from the Early Periods. Metal craft started turning into metal science in the 19th Century and got matured in 20th century. The present book, to the best of author's memory, is the first attempt to present the history of metal science in one volume, covering both extractive and physical metallurgy. The book is aimed as a supplementary text book for students in metallurgy and materials science and also selectively for general readers. After a brief introduction (Chapter 1), the second and third chapters are devoted to extractive metallurgy. The chapters related to physical metallurgy (4th to 6th) are written in a sequence such that the description of structures is given first, before highlighting the properties of metals and alloys. The final chapter 'Future Trends' highlights various topics in contemporary metal science.

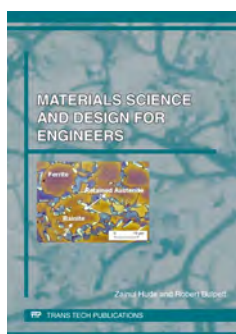
Topics: Industrial Engineering, Materials Science, Mechanical Engineering, Mechanics

Keywords: Alloys, Diffusion, Electrometallurgy, Extractive Metallurgy, Grain Growth, Hydrometallurgy, Metals, Physical Metallurgy, Pyrometallurgy, Recrystallization

Prices: Print: **US\$ 165.00/ EUR 165.00**
eBook Single-User: **US\$ 165.00/ EUR 165.00**
eBook Multi-User: **US\$ 289.00/ EUR 289.00**

Print: 978-3-03785-997-1
eBook: 978-3-03826-381-4
276 pages, 2013

<https://www.scientific.net/978-3-03785-997-1/book>



Materials Science and Design for Engineers

Volume in the series: 74

Edited by: Zainul Huda and Robert Bulpett

Volume is indexed by Thomson Reuters BCI (WoS).

The uniqueness of the title of this book, Materials Science and Design for Engineers, already indicates that the authors - professionals having over 30 years of experience in the fields of materials science and engineering - are here tackling the rarely-discussed topic of the science of materials as directly related to the domain of design in engineering applications. This comprehensive textbook has now filled that gap in the engineering literature.

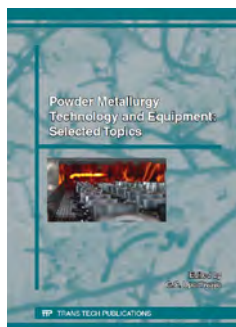
Topics: Materials Science, Mechanical Engineering

Keywords: Composite Materials, Design of Engineering Alloys, Engineering Materials, Manufacturing Properties, Materials Design, Mechanical Metallurgy, Non-Metallic Materials, Semiconductors

Prices: Print: **US\$ 165.00/ EUR 165.00**
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eBook Multi-User: **US\$ 289.00/ EUR 289.00**

Print: 978-3-03785-998-8
eBook: 978-3-03826-380-7
524 pages, 2012

<https://www.scientific.net/978-3-03785-998-8/book>



Powder Metallurgy Technology and Equipment: Selected Topics

Volume in the series: 73

Edited by: G.S. Upadhyaya

Volume is indexed by Thomson Reuters BCI (WoS).

Powder metallurgy is one of the leading processes used for forming engineering components. The technology, as developed at the beginning of the 20th century, has since advanced significantly from both the materials and energy-conservation points of view. Novel, and automated, equipment has played a significant role in enhancing the growth of the powder metallurgy industry. The present work includes, in addition to the editor's introductory paper, eleven invited papers from organizations of international repute. In brief, the book presents expert assessments from the major metal-powder and powder-metallurgy equipment-makers in the world. This distinguishes it from other works, which are contributed mainly by academics. The book concentrates on particular topics of interest and does not attempt to be comprehensive.

Topics: Materials Science, Mechanical Engineering, Mechanics

Keywords: Advanced Powder Compacting Presses, Impulse Excitation Technique, Industrial Furnaces, Mechanical Properties, Powder Metallurgy Equipment, Powder Metallurgy, Sintering Technology and Equipment

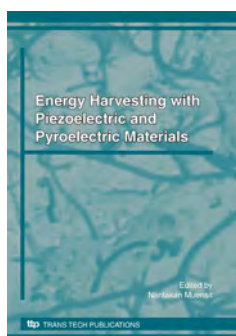
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eBook Multi-User: **US\$ 289.00/ EUR 289.00**

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eBook: 978-3-03826-379-1

176 pages, 2012

<https://www.scientific.net/978-3-03785-999-5/book>



Energy Harvesting with Piezoelectric and Pyroelectric Materials

Volume in the series: 72

Edited by: Nantakan Muensit

Volume is indexed by Thomson Reuters BCI (WoS).

The purpose of this book is to present the current state of knowledge in the field of energy harvesting using piezoelectric and pyroelectric materials. The book is addressed to students and academics engaged in research in the fields of energy harvesting, material sciences and engineering. Scientists and engineers who are working in the area of energy conservation and renewable energy resources should find it useful as well. Explanations of fundamental physical properties such as piezoelectricity and pyroelectricity are included to aid the understanding of the non-specialist. Specific technologies and particular applications are also presented. This book is divided into two parts, each subdivided into chapters. Part I concerns fundamentals. Chapter 1 reports the discoveries, standard issues and various materials involved with energy harvesting. Chapter 2 presents electromechanical models enabling an understanding of how energy harvesting systems behave. The vibration theory and designs for various piezoelectric energy harvesting structures are addressed in Chapter 3. Chapter 4 describes the analytical expressions for the energy flow in piezoelectric energy harvesting systems, in particular, with cymbal and flexible transducers. A description of the conversion enhancement for powering low-energy consumption devices is presented in Chapter 5. Part II concerns Applications and Case Studies. It begins with Chapter 6, in which the principles and applications of piezoelectric nanogenerators are reported. Chapter 7 describes the utilization of energy harvesting from low-frequency energy sources. There are more ways to use vibrational energy than waste heat. However, Chapter 8 presents the fundamentals of an important application of heat conversion with a copolymer. Finally, commercial energy harvesting products and a technological forecast are provided in Chapter 9.

Topics: Materials Science

Keywords: Electromechanical Models, Energy Harvesting, Heat Conversion, Piezoelectric Materials, Pyroelectric Materials, Renewable Energy Resources

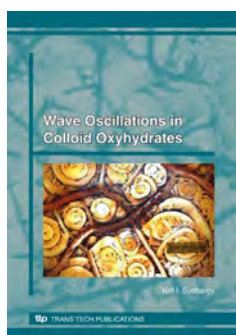
Prices: Print: **US\$ 165.00/ EUR 165.00**
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eBook Multi-User: **US\$ 289.00/ EUR 289.00**

Print: 978-0-87849-159-9

eBook: 978-3-03813-658-3

234 pages, 2011

<https://www.scientific.net/978-0-87849-159-9/book>



Wave Oscillations in Colloid Oxyhydrates

Volume in the series: 70-71

Edited by: Yuri I. Sucharev

Volume is indexed by Thomson Reuters BCI (WoS).

The importance of coherent chemistry, that is, the chemistry of periodic oscillatory processes, is increasing at a rapid rate in specific chemical disciplines. While being perfectly understood and highly developed in the fields of physical chemistry, chemical physics and biological chemistry, the periodic developmental paradigm of processes and phenomena still remains poorly developed and misunderstood in classical inorganic chemistry and related branches, such as colloid chemistry. The probability is that we miss subtle colloid chemical phenomena that could be of utmost importance if taken into consideration when catalysis or adsorption is involved. The author here reveals all of the astonishing vistas that periodic wave paradigms open up to researchers in certain colloid chemical systems, and will doubtless stimulate researchers to look at them in a new light.

Topics: Materials Science

Keywords: Biological Chemistry, Catalysis, Colloid Chemistry, Colloid Oxyhydrates, Physical Chemistry, Rare-Earth Element, Wave Oscillations, Zirconium Oxyhydrate Gels

Prices: Print: **US\$ 193.00/ EUR 193.00**
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eBook Multi-User: **US\$ 338.00/ EUR 338.00**

Print: 978-0-87849-158-2

eBook: 978-3-03813-447-3

512 pages, 2010

<https://www.scientific.net/978-0-87849-158-2/book>



DESIGN AGAINST FRACTURE AND FAILURE

Volume in the series: 69

Edited by: ZAINUL HUDA, ROBERT BULPETT and KANG YONG LEE

Volume is indexed by Thomson Reuters BCI (WoS).

The aim of this book is to develop, in the reader, the necessary skills required for designing materials, components and structures so as to resist fracture and failure in engineering applications. In order to achieve this objective, the authors have adopted a combined materials science-fracture mechanics-design approach. Although the material covered is designed for an advanced undergraduate course in metallurgy/materials engineering, students coming from mechanical, civil or aerospace engineering backgrounds will also be able to use this text as a course/reference book. In addition to students, practising engineers and production managers will also find this book very useful; particular with regard to designing components and machine elements so as to resist fracture and failure in critical applications.

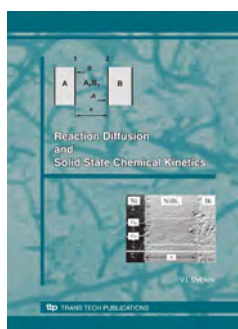
Topics: Materials Science

Keywords: Corrosion, Creep Failures, DBT, Design and Fracture Mechanics, Ductile, Fail-Safe Design, Fatigue, Fracture and Failure Mechanisms, Guarding against Fracture, Protecting Components, Strength of Materials

Prices: Print: **US\$ 165.00/ EUR 165.00**
 eBook Single-User: **US\$ 165.00/ EUR 165.00**
 eBook Multi-User: **US\$ 289.00/ EUR 289.00**

Print: 978-0-87849-157-5
 eBook: 978-3-03813-446-6
 221 pages, 2010

<https://www.scientific.net/978-0-87849-157-5/book>



Reaction Diffusion and Solid State Chemical Kinetics

Volume in the series: 67-68

Edited by: V.I. Dybkov

Volume is indexed by Thomson Reuters BCI (WoS).

This monograph deals with a physico-chemical approach to the problem of the solid-state growth of chemical compound layers and reaction-diffusion in binary heterogeneous systems formed by two solids; as well as a solid with a liquid or a gas. It is explained why the number of compound layers growing at the interface between the original phases is usually much lower than the number of chemical compounds in the phase diagram of a given binary system. For example, of the eight intermetallic compounds which exist in the aluminium-zirconium binary system, only ZrAl₃ was found to grow as a separate layer at the Al-Zr interface under isothermal conditions. The physico-chemical approach predicts that, in most cases, the number of compound layers should not exceed two; with the main factor, resulting in the appearance of additional layers, being crack formation due to thermal expansion and volume effects.

Topics: Materials Science

Keywords: Aluminium-Zirconium Binary System, Chemical Compound Layers, Corrosion, Crack Formation, Diffusion Reaction, Dissimilar Metals, Protective Coatings, Soldering, Solid State Chemical Kinetics, Solid State Chemistry, Thin-Film Electronics Technology, Welding

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 eBook Multi-User: **US\$ 338.00/ EUR 338.00**

Print: 978-0-87849-156-8
 eBook: 978-3-03813-445-9
 334 pages, 2010

<https://www.scientific.net/978-0-87849-156-8/book>



Carbon Based Nanomaterials

Volume in the series: 65-66

Edited by: Nasar Ali, Prof. Andreas Öchsner and Waqar Ahmed

Volume is indexed by Thomson Reuters BCI (WoS).

Carbon is an essential constituent element of all living organisms. A unique feature of carbon is the variety of forms that it can assume when two or more atoms bond. Carbon has thus attracted, and continues to attract, considerable R&D interest from researchers all over the world. The use of carbon in nanotechnology is a very promising area of research, and considerable government funding is being invested in carbon nanotechnology research.

Topics: Materials Science

Keywords: Carbon Allotropes, Carbon Nanotechnology, Carbon Nanotubes, Carbon-Based Nanomaterial, Crystallographic Forms, Diamonds, Fullerenes, Graphene, Graphite, Nanodiamondoids, Nanotubes

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 eBook Multi-User: **US\$ 338.00/ EUR 338.00**

Print: 978-0-87849-155-1
 eBook: 978-3-03813-444-2
 332 pages, 2010

<https://www.scientific.net/978-0-87849-155-1/book>



Electronic Materials

Volume in the series: 63-64

Edited by: H.L.Kwok

Volume is indexed by Thomson Reuters BCI (WoS).

The electronic properties of solids have become of increasing importance in the age of information technology. The study of solids and materials, while having originated from the disciplines of physics and chemistry, has evolved independently over the past few decades. The classical treatment of solid-state physics, which emphasized classifications, theories and fundamental physical principles, is no longer able to bridge the gap between materials advances and applications. In particular, the more recent developments in device physics and technology have not necessarily been driven by new concepts in physics or new materials, but rather by the ability of engineers to control crystal structures and properties better via advances in crystal growth and patterning techniques. In many cases, new applications simply arise from the adaption of conventional ideas to interdisciplinary areas. One example is that of recent advances which rely heavily upon the availability of the sub-micron technology developed by the semiconductor industry. Another example is the emergence of nanotechnology.

Topics: Materials Science

Keywords: Crystal Structures, Crystal Growth, Electronic Materials, Electronic Properties, Insulators, Light-Sensitive Solids, Magnetic Solids, Patterned Technique, Semiconductors, Solid-State Physics

Prices: Print: **US\$ 193.00/ EUR 193.00**
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Print: 978-0-87849-154-4
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 486 pages, 2010

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Biomaterials for Bone, Regenerative Medicine

Volume in the series: 62

Edited by: N. Sooraj Hussain & J. D. Santos

Volume is indexed by Thomson Reuters BCI (WoS).

The aim of "Biomaterials for Bone Regenerative Medicine" is to review extensively the latest developments in Biomaterials and their application to bone regeneration in vivo. Indeed, research on biomaterials and their novel applications is essential because of the health issues related to the aging population. A wide range of worldwide investigations is being undertaken by eminent scholars in order to develop further innovative materials for next-generation applications. In future, it is expected that a tissue engineering approach, associating novel biomaterials with stem cells, will be available for all types of bone defect.

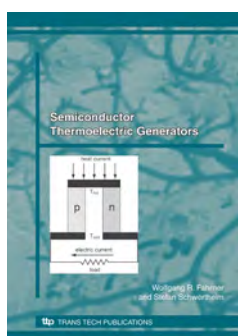
Topics: Materials Science

Keywords: Biomaterials, Bone Defects, Bone Regeneration, Calcium Phosphate, Hydroxy-Apatite Composites, Regenerative Medicine, Scaffolds, Skeletal Tissue, Tissue Engineering

Prices: Print: **US\$ 132.00/ EUR 132.00**
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 eBook: 978-3-03813-442-8
 210 pages, 2010

<https://www.scientific.net/978-0-87849-153-7/book>



Semiconductor Thermoelectric Generators

Volume in the series: 61

Edited by: Wolfgang R. Fahrner and Stefan Schwertheim

It is well-known that fossil fuels are being rapidly depleted, and that atomic power is rejected by many people. As a consequence, there is a strong trend towards alternative sources such as wind, photovoltaics, solar heat and biomass. Strangely enough, quite another power source is generally neglected: namely, the thermoelectric generator (a device which converts heat, i.e. thermal energy, directly into electrical energy). The reason for this neglect is probably the low conversion efficiency, which is of the order of a few percent at most. However, there are two arguments in favor of the thermoelectric generator. Firstly, we might in effect be at the same point as we were in the early stages of photovoltaics use (it was only in 1954 that the first attractive solar cells, with efficiencies of around 4% were produced). Today, even large modules attain 20%. Secondly, the potential applications of thermoelectric generators are very tempting. Wherever heat is generated, it is amenable to electrical conversion. Energy harvesting via a thermoelectric generator may be accompanied by a further benefit: The use of a solar module inevitably leads to a drastic temperature rise. A thermoelectric generator reduces the temperature rise and therefore offers a double benefit.

Topics: Materials Science

Keywords: Electrical Conversion, Energy-Saving Device, Power Sources, Renewable Energies, Semiconductors, Thermoelectric Generators

Prices: Print: **US\$ 132.00/ EUR 132.00**
 eBook Single-User: **US\$ 132.00/ EUR 132.00**
 eBook Multi-User: **US\$ 231.00/ EUR 231.00**

Print: 978-0-87849-152-0
 eBook: 978-3-03813-321-6
 140 pages, 2009

<https://www.scientific.net/978-0-87849-152-0/book>



Precision Die Design

Volume in the series: 59-60

Edited by: Prof. Akii Okonigbon Akaehomen Ibadode

Volume is indexed by Thomson Reuters BCI (WoS).

This book presents a new method for the design of the precision dies used in cold-forging, extrusion and drawing processes. The method is based upon die expansion, and attempts to provide a clear-cut theoretical basis for the selection of critical die dimensions for this group of precision dies when the tolerance on product diameter (or thickness) is specified. It also presents a procedure for selecting the minimum-production-cost die from among a set of design alternatives.

Topics: Materials Science

Keywords: Die Design, Drawing Processes, Engineering Plasticity, Extrusion Processes, Material Strength, Metal Machining

Prices: Print: **US\$ 193.00/ EUR 193.00**
eBook Single-User: **US\$ 193.00/ EUR 193.00**
eBook Multi-User: **US\$ 338.00/ EUR 338.00**

Print: 978-0-87849-151-3
eBook: 978-3-03813-320-9
252 pages, 2009

<https://www.scientific.net/978-0-87849-151-3/book>



Sintering of Systems with Interacting Components

Volume in the series: 57-58

Edited by: A.P. Savitskii

Volume is indexed by Thomson Reuters BCI (WoS).

The aim of this publication is to acquaint those readers who are interested in the fundamentals of powder materials sintering, with the latest scientific achievements which are important to its successful practice. The book contains new information, not previously known in the West, as well as offering a totally fresh view of this vital issue. The work discloses to western eyes a new scientific trend in the science of sintering systems with interacting components; a trend of which many experts are unaware. The new approach will considerably enrich and advance investigations into the theory and practice of sintering and aid their further development.

Topics: Materials Science

Keywords: Ceramics, Chemical Equilibrium, Composite Materials, Interacting Components, Mixed Powder Bodies, Powder Materials Sintering, Two-Component Powder Bodies

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Print: 978-0-87849-150-6
eBook: 978-3-03813-319-3
290 pages, 2009

<https://www.scientific.net/978-0-87849-150-6/book>



Solid-State Synthesis of Magnesium-Based Functional Alloys and Compounds

Volume in the series: 56

Edited by: T. Aizawa

Volume is indexed by Thomson Reuters BCI (WoS).

Since the mid-nineties, magnesium-based alloys and compounds have been revisited in the hope that they will yield light functional materials. In this third wave of research and development of magnesium-based hydrogenstorage and thermoelectric materials, new factors have become important in addition to the improvement of their properties and performance. The move to reduce environmental damage requires the assurance of non-toxicity and energy-saving during manufacture. For example, the use of lead or bismuth additions must be avoided. Furthermore, due to the diminishing sources of antimony, tellurium and rare-earth elements, only metallic and non-metallic elements having a large Clerk number should be used for production. In order to compensate for these restraints, nano-technological innovation is urgently required; not only in optimum material design but also in material processing, manufacturing and device production, in order to achieve significant energy and cost savings.

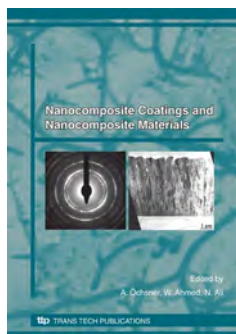
Topics: Materials Science

Keywords: Magnesium-Based Functional Alloys, Magnesium-Based Functional Compounds, Metallic Elements, Non-Metallic Elements, Rare-Earth Elements, Solid-State Synthesis, Thermoelectric Materials

Prices: Print: **US\$ 100.00/ EUR 100.00**
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eBook Multi-User: **US\$ 231.00/ EUR 231.00**

Print: 978-0-87849-478-1
eBook: 978-3-03813-325-4
100 pages, 2009

<https://www.scientific.net/978-0-87849-478-1/book>



Nanocomposite Coatings and Nanocomposite Materials

Volume in the series: 54-55

Edited by: Prof. Andreas Öchsner, W. Ahmed and N. Ali

Volume is indexed by Thomson Reuters BCI (WoS).

Nanocomposite materials are formed by mixing two or more dissimilar materials at the nanoscale in order to control and develop new and improved structures and properties. The properties of nanocomposites depend not only upon the individual components used but also upon the morphology and the interfacial characteristics. Nanocomposite coatings and materials are among the most exciting and fastest-growing areas of research; with new materials being continually developed which often exhibit novel properties that are absent in the constituent materials. Nanocomposite materials and coatings therefore offer enormous potential for new applications including: aerospace, automotive, electronics, biomedical implants, non-linear optics, mechanically reinforced lightweight materials, sensors, nano-wires, batteries, bioceramics, energy conversion and many others.

Topics: Materials Science

Keywords: Aerospace, Biomedical Implants, Electronics, Hierarchical Nanocomposites, Hybrid Nanostructured Materials, Interfacial Characteristics, Mechanically Reinforced Lightweight Materials, Morphology Characteristics, Nanocomposite Coatings, Nanocomposite Materials, Nano-Wires, Organic-Inorganic Nanocomposite

Prices: Print: **US\$ 193.00/ EUR 193.00** Print: 978-0-87849-346-3
eBook Single-User: **US\$ 193.00/ EUR 193.00** eBook: 978-3-03813-322-3
eBook Multi-User: **US\$ 338.00/ EUR 338.00** 402 pages, 2009

<https://www.scientific.net/978-0-87849-346-3/book>



A Study of Ion Cluster Theory of Molten Silicates and some Inorganic Substances

Volume in the series: 52-53

Edited by: Jiang GuoChang, Wu YongQuan, You JingLin and Zheng ShaoBo

Volume is indexed by Thomson Reuters BCI (WoS).

The first part of this monograph consists of a discussion of the microstructures of molten silicates and other inorganic substances. It is made up of seven chapters. Chapter 1 considers developments in ion-cluster theory. Chapter 2 introduces experimental approaches to the direct monitoring of a molten sample, such as hightemperature Raman spectroscopes which have successfully recorded Raman spectra from melts at temperatures of 2000K or more. Chapter 3 shows that five types of Si-O tetrahedron are appropriate microstructural units for setting up structural models. Chapter 4 confirms the SiOT model as being the primary ion-cluster theory for the efficient and reliable description of high-temperature Raman spectra. In Chapter 5, the CEMS model is created in order to interconnect microstructures and thermodynamic properties - with no adjustable parameters. Chapter 6 discusses the applicability of ab initio calculations. The Raman spectra of other inorganic compounds are shown in Chapter 7, and the use of Raman spectra to study phase transformations and solid/melt interfaces is also discussed.

Topics: Materials Science

Keywords: Ceramics, Crystallography, Inorganic Substances, Ion Cluster Theory, Metallurgy, Microstructural Units, Molten Silicates, Raman Spectra, SiOT Model, Thermodynamic Properties

Prices: Print: **US\$ 193.00/ EUR 193.00** Print: 978-0-87849-388-3
eBook Single-User: **US\$ 193.00/ EUR 193.00** eBook: 978-3-03813-324-7
eBook Multi-User: **US\$ 338.00/ EUR 338.00** 284 pages, 2009

<https://www.scientific.net/978-0-87849-388-3/book>



Advanced Techniques for Materials Characterization

Volume in the series: 49-51

Edited by: A. K. Tyagi, Mainak Roy, S. K. Kulshreshtha and S. Banerjee

Volume is indexed by Thomson Reuters BCI (WoS).

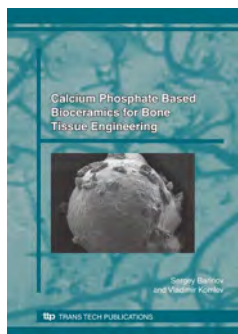
Nowadays, an impressively large number of powerful characterization techniques is being used by physicists, chemists, biologists and engineers in order to solve analytical research problems; especially those related to the investigation of the properties of new materials for advanced applications. Although there are a few available books which deal with such experimental techniques, they are either too exhaustive and cover very few techniques or are too elementary to provide a solid basis for learning to use the characterization technique. Moreover, such books usually over-emphasize the textbook approach: being full of theoretical concepts and mathematical derivations, and omitting the practical instruction required in order to permit newcomers to use the techniques.

Topics: Materials Science

Keywords: Advance Materials, Analytical Research Problems, Characterisation Techniques, Diffraction Techniques, Microscopic Techniques, Physical Measurement Methods, Positron Annihilation Spectroscopy, Small-Angle Neutron Scattering, Small-Angle X-Ray Scattering, Spectroscopic Techniques

Prices: Print: **US\$ 314.00/ EUR 314.00** Print: 978-0-87849-379-1
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eBook Multi-User: **US\$ 347.00/ EUR 347.00** 528 pages, 2009

<https://www.scientific.net/978-0-87849-379-1/book>



Calcium Phosphate Based Bioceramics for Bone Tissue Engineering

Volume in the series: 48

Edited by: Sergey Barinov and Vladimir Komlev

Tissue engineering is a new biotechnology that combines various aspects of medicine, biology and engineering, in order to produce, repair or replace human tissue. It is therefore easy to grasp the potential of these new therapies in helping to improve the quality-of-life of patients suffering from rare diseases. Typically, bone tissue engineering approaches foresee the use of scaffolding material combined with tissue cells. An advanced scaffolding material for tissue engineering must exhibit high quality, reliability, sustainability and cost-effectiveness throughout the individual's life and provide new advanced levels of medical assistance in therapy and surgery. One particular requirement of bone tissue engineering is that the scaffold should be porous because, in that form, large numbers of cells can be incorporated.

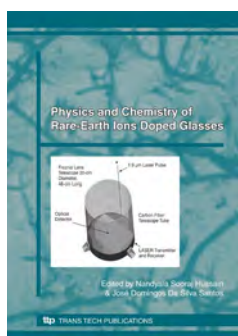
Topics: Materials Science

Keywords: Bioceramics, Bone Cements, Bone Tissue Engineering, Calcium Phosphate, Crystallochemistry, Porous Ceramics, Scaffolds Material, Surgery, Therapy

Prices: Print: **US\$ 138.00/ EUR 138.00**
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Print: 978-0-87849-380-7
eBook: 978-3-03813-237-0
170 pages, 2008

<https://www.scientific.net/978-0-87849-380-7/book>



Physics and Chemistry of Rare-Earth Ions Doped Glasses

Volume in the series: 46-47

Edited by: Dr. Sooraj Hussain Nandyala and Prof. José Domingos da Silva Santos

The aim of this work is to review the latest developments in glass science and technology. It presents various types of glass, of both academic and technological importance, in which the host is doped with rare-earth ions.

Topics: Materials Science

Keywords: Glass, Glass Science, Ion Doped Glass, Optical Glass, Rare-Earth

Prices: Print: **US\$ 193.00/ EUR 193.00**
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Print: 978-0-87849-481-1
eBook: 978-3-03813-242-4
300 pages, 2008

<https://www.scientific.net/978-0-87849-481-1/book>



Time-dependent Mechanical Properties of Solids

Volume in the series: 45

Edited by: Wolfgang Gräfe

This treatment of "Time-Dependent Mechanical Properties of Solids" begins with a phenomenological description of the transport of some unspecified entity. It is assumed that the transport is caused by mechanical stresses or temperature fields. This hypothesis is based upon just a few well-established methods such as, for instance, the Zener theory of diffusion and the Inglis equation for stress enhancement. Using these assumptions, it is possible to deduce formulae for a theoretically based description of several phenomena without referring to any specific process or entity.

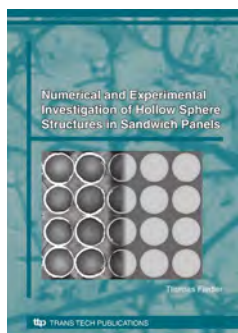
Topics: Materials Science

Keywords: Activation Energy, Defect Growth, Density Relaxation, Dislocations, Fatigue of Metals, Glasses, Internal Friction, Migration Processes, Solids, Stress Relaxation

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eBook: 978-3-03813-239-4
162 pages, 2008

<https://www.scientific.net/978-0-87849-476-7/book>



Numerical and Experimental Investigation of Hollow Sphere Structures in Sandwich Panels

Volume in the series: 44

Edited by: Thomas Fiedler

This work addresses the performance of novel metallic hollow-sphere structures (MHSS) in sandwich panels. Numerical finite-element analyses and experimental tests are described.

Topics: Materials Science

Keywords: Cellular Metals, Finite Element Method, Material Composition, Mechanical Properties, Metallic Hollow Sphere Structures, Morphology, Sandwich Panels, Thermal Conductivities, Thermal Properties, Topology

Prices: Print: **US\$ 132.00/ EUR 132.00**
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Print: 978-0-87849-398-2
eBook: 978-3-03813-238-7
136 pages, 2008

<https://www.scientific.net/978-0-87849-398-2/book>



Biomaterials and Biomedical Engineering

Volume in the series: 41-43

Edited by: W. Ahmed, N. Ali and Prof. Andreas Öchsner

Biomedical engineering involves the application of the principles and techniques of engineering to the enhancement of medical science as applied to humans or animals. It involves an interdisciplinary approach which combines the materials, mechanics, design, modelling and problem-solving skills employed in engineering with medical and biological sciences so as to improve the health, lifestyle and quality-of-life of individuals. Biomedical engineering is a relatively new field, and involves a whole spectrum of disciplines covering: bioinformatics, medical imaging, image processing, physiological signal processing, biomechanics, biomaterials and bioengineering, systems analysis, 3-D modelling, etc. Combining these disciplines, systematically and synergistically yields total benefits which are much greater than the sum of the individual components. Prime examples of the successful application of biomedical engineering include the development and manufacture of biocompatible prostheses, medical devices, diagnostic devices and imaging equipment and pharmaceutical drugs.

The purpose of this book is to present the latest research and development carried out in the areas of biomedical engineering, biomaterials and nanomaterials science and to highlight the applications of such systems. Particular emphasis is given to the convergence of nano-scale effects, as related to the delivery of enhanced biofunctionality.

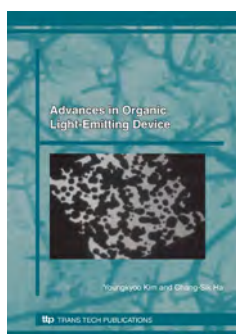
Topics: Materials Science

Keywords: 3-D Modeling, Adsorption of Proteins and Amino Acids, Bioactive Glasses, Bone Regeneration, Cell-Surface Interactions, Drug Delivery, Health Hazards of Manufactured, Implants, Medical Imaging, Micro and Nano Fibers, Systems Analysis

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eBook Multi-User: **US\$ 347.00/ EUR 347.00**

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eBook: 978-3-03813-241-7
560 pages, 2008

<https://www.scientific.net/978-0-87849-480-4/book>



Advances in Organic Light-Emitting Device

Volume in the series: 40

Edited by: Youngkyoo Kim and Chang-Sik Ha

Organic electroluminescence (OEL) is the phenomenon of electrically-driven emission of light from organic materials; including both fluorescent and phosphorescent organic solids. The organic light-emitting device (OLED), which exploits OEL emission from organic semiconducting thin films (with thicknesses of less than a few hundred nanometers), sandwiched between electrodes, has attracted keen interest in its application to flat-panel displays, due to its high luminous efficiency, low driving voltage, tunable colors as well as a convenient device-structure design and low fabrication costs when compared with every other known display device.

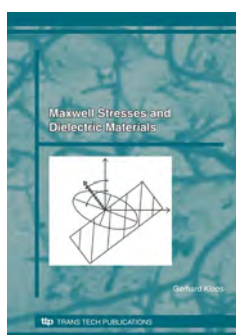
Topics: Materials Science

Keywords: Carrier Injection and Transport, Dexter Energy, Förster Energy, Hole-Transporting Materials, Hybrid OLED, Light-Emitting Polymers, OLED, Organic Electroluminescence (OEL), Phosphorescent (PHOLED), Polymer, Tunneling

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140 pages, 2008

<https://www.scientific.net/978-0-87849-483-5/book>



Maxwell Stresses and Dielectric Materials

Volume in the series: 39

Edited by: Gerhard Kloos

Electrostatic stresses are a fascinating field where materials science, continuum mechanics and electrical engineering all come together. This is one of the reasons why the study of these so-called Maxwell stresses is so interesting.

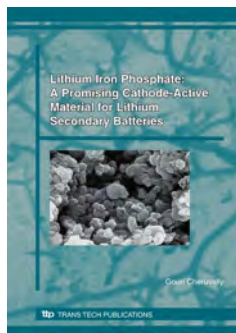
Topics: Materials Science

Keywords: Dielectric Tensor, Electromechanical Effects, Electrostatic Stresses, Electrowetting, Linear Effects, Maxwell Stresses, Polymers, Quadratic Effects

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eBook: 978-3-03826-924-3
114 pages, 2008

<https://www.scientific.net/978-0-87849-479-8/book>



Lithium Iron Phosphate: A Promising Cathode-Active Material for Lithium Secondary Batteries

Volume in the series: 38

Edited by: Gouri Cheruvally

Since the first development of lithium-ion batteries in the early 1990's, there have been tremendous advances in the science and technology of these electrochemical energy sources. At present, lithium batteries dominate the field of advanced power sources and have almost entirely replaced their bulkier and less energetic counterparts such as nickel-cadmium and nickel-metalhydride batteries; especially in portable electronic devices. But lithium batteries are still the object of continuing intense research aimed at making further improvements in performance and safety, at lower cost, so as to make them suitable for higher-power and more demanding applications such as electric vehicles. The research and development of new electrode materials, particularly for cathodes, having an improved electrochemical performance has always been a matter of changing focus. Thus, olivine, lithium iron phosphate, has attracted considerable attention in recent years as a safe, environmentally friendly, extremely stable and very promising cathode material.

Topics: Materials Science

Keywords: Cathode Materials, Electrochemical Energy Sources, Electronic Conductivity, Ionic Conductivity, Lithium Iron Phosphate, Lithium-Ion Batteries, Nickel-Cadmium Batteries, Safety and Storage of Lithium Batteries, Synthesis of Lithium Iron Phosphate

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 eBook Multi-User: **US\$ 242.00/ EUR 242.00**

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 eBook: 978-3-03813-240-0
 148 pages, 2008

<https://www.scientific.net/978-0-87849-477-4/book>



Mechanisms of High Temperature Corrosion

Volume in the series: 36-37

Edited by: Pierre SARRAZIN, Alain GALERIE, Jacques FOULETIER

The oxidation of metals is, by definition, a reaction between a gas and a solid which usually produces a solid reaction product. At first glance, this would therefore seem to be a very simple process but, in fact, it is considerably more complex. One would like to think that the reaction product, i.e., the scale that forms on the metal, acts as a physical barrier between the reactants, and that the reaction should thus cease once the barrier is established. We know that this is unfortunately not the case, because transport of matter through the scale allows the reaction to continue. We also know that, because of density-differences between the metal and its oxide, the scale may not be sufficiently complete in coverage or may not adhere to the substrate because of cracking, spalling and detachment (wrinkling). In some extreme cases, the scale may even be a liquid which simply drips from the surface, or it may volatilize at operational temperatures. The reaction between a gas and a metal is truly very complicated.

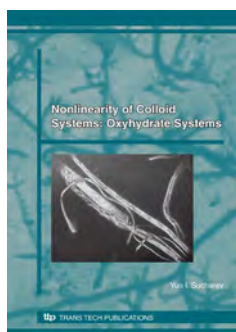
Topics: Materials Science

Keywords: Chemical Potential, Corrosion, Corrosion Protection, Gas-Solid Equilibrium, Growth and Thermal Stresses, Metals Oxidation, Oxidant Gases, Oxidation Kinetics, p- and n-type Semi-Conduction, Point Defects, Porous Scales, Thermodynamic

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 346 pages, 2008

<https://www.scientific.net/978-0-87849-484-2/book>



Nonlinearity of Colloid Systems: Oxyhydrate Systems

Volume in the series: 34-35

Edited by: Yuri I. Sucharev

The present monograph is the first systematic study of the non-linear characteristic of gel oxy-hydrate systems involving d- and f- elements. These are the oxyhydrates of rare-earth elements and oxides – hydroxides of d- elements (zirconium, niobium, titanium, etc.) The non-linearity of these gel systems introduces fundamental peculiarities into their structure and, consequently, their properties.

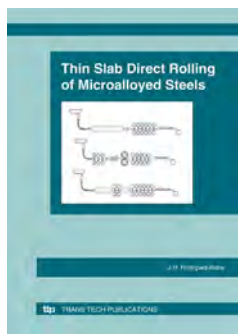
Topics: Materials Science

Keywords: Coherent Chemistry, Colouring of Oxyhydrate Gel, Copolymerisation, d- and f- Elements, Electrophoretic, Gel Oxyhydrate, Heavy Metals, Molecular Dynamic, Monte-Carlo Method, Optical Properties, Periodic Dilatancy, Polymerisation of Hydrated, Radiation Conditions, Sorption Properties

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 434 pages, 2008

<https://www.scientific.net/978-0-87849-482-8/book>



Thin Slab Direct Rolling of Microalloyed Steel

Volume in the series: 33

Edited by: J.M. Rodriguez-Ibabe

Thin slab casting and direct rolling (TSDR) technologies are nowadays one of the most promising processing routes to maintain steel as a leading material in technological applications. Initially, this process was exclusively for the production of mild steels. As industrial experience and knowledge improved, a rapid expansion of the range of products took place with higher strength grades becoming an important part of the overall production. Actually, it is widely accepted as a route to produce high value grades and it can be considered as a technology which has reached a high degree of maturity. This book aims to provide an approach to the different metallurgical aspects involved in the application of thermomechanical treatments in the TSDR route.

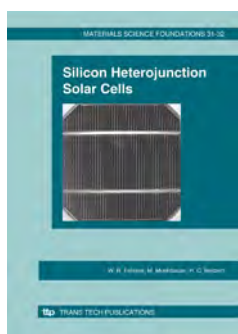
Topics: Materials Science

Keywords: Austenite Transformation, C-Mn-V Steels, Continuous Casting, Controlled Rolling, Conventional Rolling, Microalloying Elements, Recrystallisation, Structural and HSLA Steels, Thermomechanical Processing of Microalloyed Steel, TSDR Routes

Prices: Print: **US\$ 88.00/ EUR 88.00**
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eBook: 978-3-03813-162-5
146 pages, 2007

<https://www.scientific.net/978-0-87849-485-9/book>



Silicon Heterojunction Solar Cells

Volume in the series: 31-32

Edited by: W.R. Fahrner, M. Muehlbauer and H.C. Neitzert

The world of today must face up to two contradictory energy problems: on the one hand, there is the sharply growing consumer demand in countries such as China and India. On the other hand, natural resources are dwindling. Moreover, many of those countries which still possess substantial gas and oil supplies are politically unstable. As a result, renewable natural energy sources have received great attention. Among these, solar-cell technology is one of the most promising candidates. However, there still remains the problem of the manufacturing costs of such cells. Many attempts have been made to reduce the production costs of "conventional" solar cells (manufactured from monocrystalline silicon using diffusion methods) by instead using cheaper grades of silicon, and simpler pn-junction fabrication. That is the 'hero' of this book; the heterojunction solar cell.

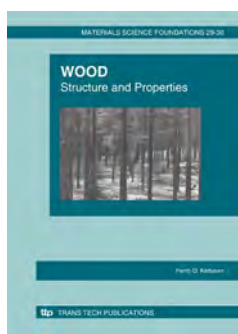
Topics: Materials Science

Keywords: Absorber Material, Amorphous Silicon, Deposition Temperature, Emitter Layer, Grid, Metallization, Microcrystalline Silicon, Photovoltaics, Semiconductor Thin Layers, Surface Treatment

Prices: Print: **US\$ 171.00/ EUR 171.00**
eBook Single-User: **US\$ 171.00/ EUR 171.00**
eBook Multi-User: **US\$ 299.00/ EUR 299.00**

Print: 978-0-87849-486-6
eBook: 978-3-03813-102-1
208 pages, 2006

<https://www.scientific.net/978-0-87849-486-6/book>



WOOD

Volume in the series: 29-30

Edited by: Pentti O. Kettunen

One of the oldest construction materials is wood which, technically speaking, belongs to the group of polymer matrix composites; one which is conveniently and expertly produced by Nature. Due to its organic cell-type structure, the density of wood remains modest. Thus, as its strength and stiffness can - in certain cases - attain remarkable values, its levels of specific strength and stiffness (absolute strength or stiffness divided by density) can reach magnitudes which are competitive with those of other construction materials. It is demonstrated, for instance, that the specific strength of wood in the axial direction can exceed those of low-carbon steel and concrete. Its specific stiffness can also be comparable to those of aluminum alloys and low-carbon steels, and is better than that of concrete. In constructional design, especially in the dimensioning of supports, the values of specific strength and stiffness are of utmost importance.

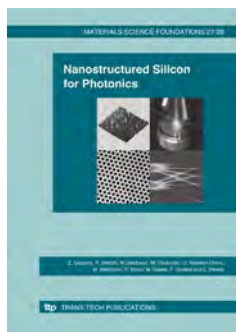
Topics: Materials Science

Keywords: Chemical Degradation, Creep, Strain and Strength, Deterioration of Wood, Electrical Properties, Forestry, Fracture, Hardwood, Hydrothermal Deformation, Laminas Fiber, Liquids in the Structure of Wood, Moisture of Wood, Polymer Matrix Composites, Porosity of Wood, Softwood, Wood Density, Wood Thermal Conductivity

Prices: Print: **US\$ 209.00/ EUR 209.00**
eBook Single-User: **US\$ 198.00/ EUR 198.00**
eBook Multi-User: **US\$ 347.00/ EUR 347.00**

Print: 978-0-87849-487-3
eBook: 978-3-03813-103-8
419 pages, 2006

<https://www.scientific.net/978-0-87849-487-3/book>



Nanostructured Silicon for Photonics

Volume in the series: 27-28

Edited by: Z. Gaburro, P. Bettotti, N. Daldosso, M. Ghulinyan, D. Navarro-Urrios, M. Melchiorri, F. Riboli, M. Saiani, F. Sbrana and L. Pavesi

The use of light to channel signals around electronic chips could solve several current problems in microelectronic evolution including: power dissipation, interconnect bottlenecks, input/output from/to optical communication channels, poor signal bandwidth, etc. It is unfortunate that silicon is not a good photonic material: it has a poor light-emission efficiency and exhibits a negligible electro-optical effect. Silicon photonics is a field having the objective of improving the physical properties of silicon; thus turning it into a photonic material and permitting the full convergence of electronics and photonics.

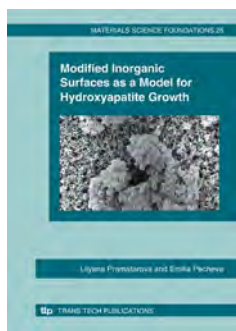
Topics: Materials Science

Keywords: Band Structure, Nanoprobe Techniques, Nano-Sized Silicon, Optical Communication, Optical Gain, Photonic Crystals, Power Dissipation, Si-Based Waveguides, Silicon LED, Silicon Nanocrystals

Prices: Print: **US\$ 171.00/ EUR 171.00**
eBook Single-User: **US\$ 171.00/ EUR 171.00**
eBook Multi-User: **US\$ 299.00/ EUR 299.00**

Print: 978-0-87849-488-0
eBook: 978-3-03813-104-5
260 pages, 2006

<https://www.scientific.net/978-0-87849-488-0/book>



Modified Inorganic Surfaces as a Model for Hydroxyapatite Growth

Volume in the series: 26

Edited by: Lilyana Pramatarova and Emilia Pecheva

The process by which organisms in Nature create minerals is known as biomineralization - a process that involves complex interactions between inorganic ions, crystals and organic molecules; resulting in a controlled nucleation and growth of minerals from aqueous solutions. During the last few decades, biomineralization has been intensively studied, due to its involvement in a wide range of biological events; starting with the formation of bones, teeth, cartilage, shells, coral (so-called physiological mineralization) and encompassing pathological mineralization, i.e. the formation of kidney stones, dental calculi, osteoporosis, arteriosclerosis, osteogenesis imperfecta, etc. During the same period, biomineralization has become a hot topic for world-wide research throughout the world, due to the growing expectations of a good quality and duration of life by the ever-increasing population of the aged. Young people, in particular, also make increasing demands on the quality and the appearance of the existing implants available on the market. The general goals of research and manufacture are now to create and improve implants for various applications in the human body, as well as to prevent diseases leading to the formation of minerals such as hydroxyapatite (implicated, for example, in osteogenesis, kidney stones, dental calculi, arteriosclerosis - all problems which mainly affect women).

The results presented in this book will make a significant contribution to the application of the modified surfaces of widely-studied materials as a model system for hydroxyapatite-coating, to the cultivation of cells on surfaces, as well as to the growth of hydroxyapatite by applying new technologies (such as laser-liquid-solid interaction) that facilitate nucleation and growth. In this way, materials and layers having possible applications as implants, biosensors, etc. can be obtained. The in vitro system described here is universal and can be applied not only to the production of hydroxyapatite coatings for implants, but also to investigating the basic mechanisms of mineral-formation diseases and thus identify new directions for prophylaxis. This will then make a strong contribution to improving the quality and duration of life of the population.

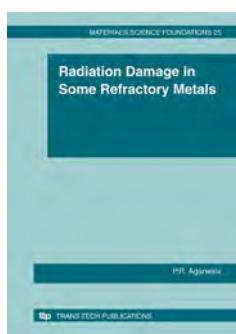
Topics: Materials Science

Keywords: Biomineralization, Crystals and Organic Molecules, Deposition of Nanostructures, Hydroxyapatite Layers, Implanted Inorganic Ions, Laser Irradiation, Nanostructured Surfaces

Prices: Print: **US\$ 88.00/ EUR 88.00**
eBook Single-User: **US\$ 88.00/ EUR 88.00**
eBook Multi-User: **US\$ 154.00/ EUR 154.00**

Print: 978-0-87849-489-7
eBook: 978-3-03813-105-2
136 pages, 2006

<https://www.scientific.net/978-0-87849-489-7/book>



Radiation Damage in Some Refractory Metals

Volume in the series: 25

Edited by: R.P. Agarwala

In Chapter-1 of this timely book, radiation damage in vanadium, niobium, molybdenum and tungsten is discussed at the atomic level; treating - for instance - third-stage recovery in terms of self-interstitials being mobile traps for - predominantly - vacancies. Higher recovery stages are treated by using various techniques, such as: electrical resistivity, electron microscopy, positron annihilation spectroscopy and computer simulation - thus revealing vacancy-cluster break-up in stage-V and interstitial cluster annealing in stage-VI.

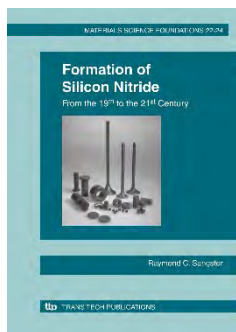
Topics: Materials Science

Keywords: A-203 Steel, Carbon Coatings, Deuterium Ion Bombardment, Neutron Irradiated Recovery, Recovery of Fast Neutron Irradiation, Recovery of Helium Ion, Refractory Coatings, Surface Ion Damage, Swelling of Vanadium, Titanium Carbide Coatings

Prices: Print: **US\$ 64.00/ EUR 64.00**
eBook Single-User: **US\$ 88.00/ EUR 88.00**
eBook Multi-User: **US\$ 154.00/ EUR 154.00**

Print: 978-0-87849-490-3
eBook: 978-3-03813-041-3
64 pages, 2005

<https://www.scientific.net/978-0-87849-490-3/book>



Formation of Silicon Nitride

Volume in the series: 22-24

Edited by: Raymond C. Sangster

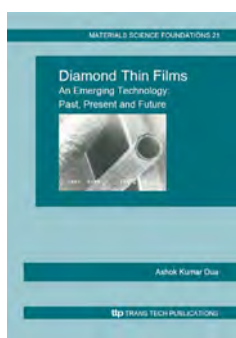
The elements: Si, N, O, C and H, have strong chemical affinities for one another. Under the correct conditions, Si-N bonding will occur in almost any Si-N-(O/C/H), and many related, reaction systems; although Si-O and Si-C are formidable competitors to Si-N. The most favored Si-N compound is stoichiometric Si₃N₄. It comes in three common varieties. How they interrelate, how one finds them and (above all) how one makes them - and how sometimes they just happen to form - are the subjects of this book, with due attention being paid to closely related matters.

Topics: Materials Science

Keywords: Chemical Vapor Deposition, Doped-Filled-Reinforced RBSN Ceramics, Iron and Steel Alloys, Metal-Silicon-Nitrogen Systems, Phases and Crystallography, Reaction Bonded Silicon Nitride, Self-Diffusion in Silicon Nitride, Silicon Nitride, Thermodynamics of Silicon Nitride

Prices: Print: **US\$ 319.00/ EUR 319.00** Print: 978-0-87849-492-7
 eBook Single-User: **US\$ 198.00/ EUR 198.00** eBook: 978-3-03813-042-0
 eBook Multi-User: **US\$ 347.00/ EUR 347.00** 960 pages, 2005

<https://www.scientific.net/978-0-87849-492-7/book>



Diamond Thin Films - An Emerging Technology: Past, Present and Future

Volume in the series: 21

Edited by: Ashok Kumar Dua

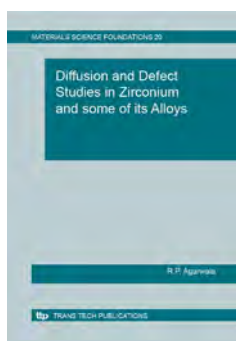
Diamond, as well as being a precious gem, is a versatile material par excellence. No other material comes anywhere near to matching its properties, which are both extreme, and also expressed in rare combinations. However, natural diamonds, and those synthesised under high sandpressure temperatures, are too expensive or small for many technological applications. These limitations can be overcome by using large-area diamond coatings; chemically bonded to inexpensive non-diamond surfaces. The consequent economic advantages provide the driving force for much diamond-related research and technology.

Topics: Materials Science

Keywords: CVD Diamond, Diamond Coatings, Diamond Related Materials, Diamond Surface, Diamond Thin Films, Emerging Technology, Natural Diamonds, Nucleation

Prices: Print: **US\$ 88.00/ EUR 88.00** Print: 978-0-87849-949-6
 eBook Single-User: **US\$ 88.00/ EUR 88.00** eBook: 978-3-0357-0635-2
 eBook Multi-User: **US\$ 154.00/ EUR 154.00** 110 pages, 2004

<https://www.scientific.net/978-0-87849-949-6/book>



Diffusion and Defect Studies in Zirconium and some of its Alloys

Volume in the series: 20

Edited by: R.P. Agarwala

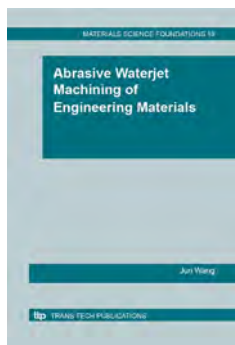
This book is divided into two parts: the first part describes diffusion processes, and the second part describes radiation damage to - and cold-working of - zirconium and some of its important alloys.

Topics: Materials Science

Keywords: Alloys, Cerium, Cold Work, Defect Interaction, Diffusion, Grain Boundary, Molybdenum, Nuclear Reactor, Organic Coolants in Nuclear Reactors, Pressurised Heavy Water, Radiation Damage, Vanadium, Zirconium

Prices: Print: **US\$ 88.00/ EUR 88.00** Print: 978-0-87849-942-7
 eBook Single-User: **US\$ 88.00/ EUR 88.00** eBook: 978-3-0357-0628-4
 eBook Multi-User: **US\$ 154.00/ EUR 154.00** 90 pages, 2004

<https://www.scientific.net/978-0-87849-942-7/book>



Abrasive Waterjet Machining of Engineering Materials

Volume in the series: 19

Edited by: Jun Wang

Manufacturing industry is becoming ever more time-conscious with regard to the global economy, and the need for rapid prototyping and small production batches is increasing. These trends have placed a premium on the use of new and advanced technologies for quickly turning raw materials into usable goods; with no time being required for tooling. The need for advanced processing technologies is particularly evident when machining advanced materials, such as ceramics, composites and thermo-sensitive materials that have wide application but are considered to be "difficult-to-machine" using conventional machining technologies such as turning and milling. Abrasive waterjet (AWJ) machining has been found to be one of the advanced technologies that meet these processing requirements; due to its distinct advantages over other machining technologies.

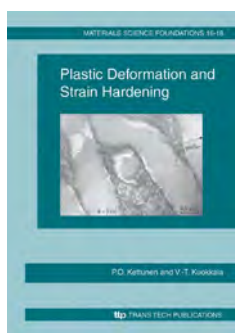
Topics: Materials Science

Keywords: Abrasive Waterjet Machining, Ceramics, Composites, Manufacturing Process, Non-Conventional Machining Technologies, Thermo-Sensitive Materials, Turning and Milling

Prices: Print: **US\$ 77.00/ EUR 77.00**
eBook Single-User: **US\$ 77.00/ EUR 77.00**
eBook Multi-User: **US\$ 135.00/ EUR 135.00**

Print: 978-0-87849-918-2
eBook: 978-3-0357-0604-8
114 pages, 2003

<https://www.scientific.net/978-0-87849-918-2/book>



Plastic Deformation and Strain Hardening

Volume in the series: 16-18

Edited by: P.O. Kettunen, V.T. Kuokkala

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.

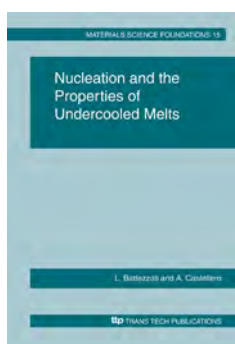
Topics: Materials Science

Keywords: Ceramics, Design, Metallic Material, Physical Metallurgy, Plastic Deformation, Polymers, Strain Hardening

Prices: Print: **US\$ 231.00/ EUR 231.00**
eBook Single-User: **US\$ 198.00/ EUR 198.00**
eBook Multi-User: **US\$ 347.00/ EUR 347.00**

Print: 978-0-87849-906-9
eBook: 978-3-0357-0597-3
420 pages, 2003

<https://www.scientific.net/978-0-87849-906-9/book>



Nucleation and the Properties of Undercooled Melts

Volume in the series: 15

Edited by: L. Battezzati and A. Castelleri

Nucleation is a central topic in Materials Science because it initiates most phase transformations. When a new phase appears within an existing phase, seeds must form before growth can occur within the given volume. The study of nucleation treats the very early stages, which involve only a limited number of atoms or molecules. It is a branch of fundamental research which has far-reaching implications for processes where nucleation is of paramount relevance to phase and microstructure selection. The development of any new material or processing route always leads to renewed interest in the topic.

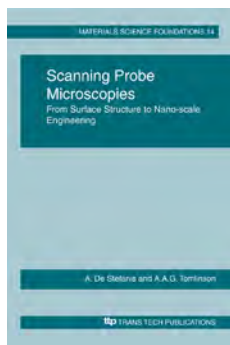
Topics: Materials Science

Keywords: Crystals, Heterophase Fluctuations, Metallic Glass-Forming Systems, Nucleation, Solidification, Thermophysical Properties, Undercooled Melts

Prices: Print: **US\$ 77.00/ EUR 77.00**
eBook Single-User: **US\$ 77.00/ EUR 77.00**
eBook Multi-User: **US\$ 135.00/ EUR 135.00**

Print: 978-0-87849-895-6
eBook: 978-3-0357-0596-6
80 pages, 2002

<https://www.scientific.net/978-0-87849-895-6/book>



Scanning Probe Microscopies

Volume in the series: 14

Edited by: A. De Stefanis and A.A.G. Tomlinson

In the 1990s, there was a considerable development in molecular chemistry through super- and supra-supermolecular stages. These featured large molecular arrays, from interlocked organic macromolecules, nanotubes, dendrimers, polyphenylenes, and many others - especially self-assembling molecules (SAM) - in repeating units in the 5 – 100 nm range. Simultaneously, materials science, and especially electronics, is still going down from microns to nanometers through utilisation of ever-shorter wavelengths in beam lithographies on substrates, especially silicon ones. In addition, unconventional fabrication methods for patterning nanostructures (again for electronics and optoelectronics) are also emerging, at the same time overlapping with other fields where mesoscopic order is responsible for function, such as bio-ordering (shells, plate ordering in animal shells and wings, DNA-derived assemblies, and so on).

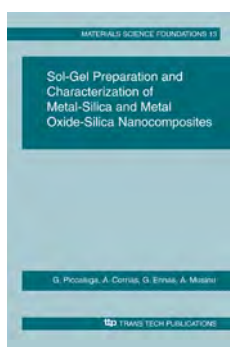
Topics: Materials Science

Keywords: Dendrimers, Molecular Chemistry, Nanotubes, Optoelectronics, Polyphenylenes, Self-Assembling Molecules

Prices: Print: **US\$ 77.00/ EUR 77.00**
 eBook Single-User: **US\$ 77.00/ EUR 77.00**
 eBook Multi-User: **US\$ 135.00/ EUR 135.00**

Print: 978-0-87849-868-0
 eBook: 978-3-0357-0595-9
 102 pages, 2001

<https://www.scientific.net/978-0-87849-868-0/book>



Sol-Gel Preparation and Characterization of Metal-Silica and Metal Oxide-Silica Nanocomposites

Volume in the series: 13

Edited by: G. Piccaluga, A. Corrias, G. Ennas, A. Musinu

Materials with nanometer size particles exhibit unique chemical and physical properties. In particular, nanocomposite materials, composed of nanometric metal and metal oxide particles embedded in vitreous matrices, present a variety of interesting magnetic, electric and catalytic properties, that are strongly size-dependent. Among the different preparation methods which can be used to obtain this kind of materials, the sol-gel process is particularly interesting because it is affected by several parameters which allow a versatile control of the structural, textural and chemical properties of the final products. The present volume focusses on the preparation of metal-silica and metal oxide-silica (Me=Ni, Fe, Zn) nanocomposites by the sol-gel method and the characterization of their structural and magnetic properties.

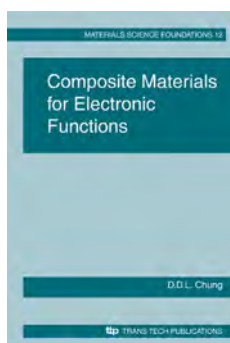
Topics: Materials Science

Keywords: Catalytic Properties, Magnetic Properties, Metal Oxide-Silica Nanocomposites, Metal-Silica Nanocomposites, Mössbauer Spectroscopy, Nanocomposite Materials, Nanometer Size Particles, Sol-Gel Process, Structural Properties, X-Ray Diffraction

Prices: Print: **US\$ 56.00/ EUR 56.00**
 eBook Single-User: **US\$ 77.00/ EUR 77.00**
 eBook Multi-User: **US\$ 135.00/ EUR 135.00**

Print: 978-0-87849-856-7
 eBook: 978-3-0357-0594-2
 56 pages, 2000

<https://www.scientific.net/978-0-87849-856-7/book>



Composite Materials for Electronic Functions

Volume in the series: 12

Edited by: D.D.L. Chung

Composite materials are traditionally designed for the mechanical properties, due to their structural applications. However, composite materials are increasingly used in non-structural applications, such as electronic packaging and thermal management. Moreover, structural composite materials that are multifunctional are increasingly needed, due to the demand of smart structures and the importance of weight saving. As a consequence, structural materials that can provide electronic functions are needed. Thus, electronic functions are desirable for both non-structural and structural composite materials.

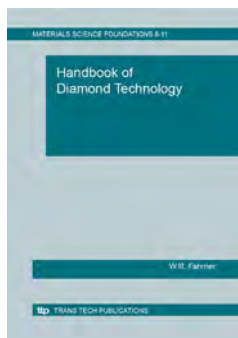
Topics: Materials Science

Keywords: Carbon Matrices, Composite Materials, Electromagnetic, Electronic Functions, Electronic Packaging, Mechanical Properties, Polymers, Smart Structures

Prices: Print: **US\$ 77.00/ EUR 77.00**
 eBook Single-User: **US\$ 77.00/ EUR 77.00**
 eBook Multi-User: **US\$ 135.00/ EUR 135.00**

Print: 978-0-87849-836-9
 eBook: 978-3-0357-0593-5
 88 pages, 2000

<https://www.scientific.net/978-0-87849-836-9/book>



Handbook of Diamond Technology

Volume in the series: 8-11

Edited by: W.R. Fahrner

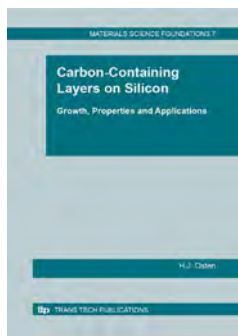
This book is the result of twenty years of experience on the fabrication of active micro-cooling systems, the fabrication of electronic devices (radiation and magnetic sensors, transistors), the fabrication of optical devices (new green LED), and the adaptation of silicon simulation software to diamond. This includes the integration of the current transport models of diamond. The book emphasizes the subjects' substrate selection, mechanical and chemical structuring, doping, and metallization. Also included is simulation as a tool to predict the results of the technological steps. Though a state of the art method is far behind in comparison to the silicon and gallium arsenide growth we assume the same state as exists in these technologies, namely that the diamond substrates are commercially available.

Topics: Materials Science

Keywords: Diamond Related Materials, Diamond Technology, Doping, Fabrication of Electronic Devices, Gallium Arsenide, Magnetic Sensors, Metallization, Micro-Cooling Systems, New Green LED, Numerical Simulation, Packaging, Radiation Sensors, Surface Structuring, Transport Models

Prices: Print: **US\$ 308.00/ EUR 308.00** Print: 978-0-87849-835-2
eBook Single-User: **US\$ 198.00/ EUR 198.00** eBook: 978-3-0357-0592-8
eBook Multi-User: **US\$ 347.00/ EUR 347.00** 680 pages, 2000

<https://www.scientific.net/978-0-87849-835-2/book>



Carbon-Containing Layers on Silicon

Volume in the series: 7

Edited by: H.J. Osten

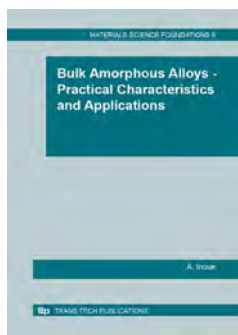
The addition of supersaturated carbon to silicon or silicon-germanium thin films leads to a new class of semiconducting materials. This new material can alleviate some of the constraints on strained Si_{1-x}Ge_x and may help to open up new fields of device applications for heteroepitaxial Si-based systems. Basic growth problems, as well as the mechanical and electrical properties of Si_{1-y}C_y and Si_{1-x-y}Ge_xC_y layers grown pseudomorphically onto Si(001), have been reviewed. The incorporation of carbon can be used (i) to enhance SiGe layer properties, (ii) to obtain layers with new properties, or (iii) to control dopant diffusion in microelectronic devices. The phenomenon of suppressed boron diffusion in carbon-rich epitaxial layers can be used to increase the performance of SiGe heterojunction bipolar transistors (HBTs). When compared with SiGe technologies, the addition of carbon offers a significantly greater flexibility in process design and a greater latitude in processing margins.

Topics: Materials Science

Keywords: Carbon Containing Alloys, Carbon-Rich Epitaxial Layers, Epitaxial Si_{1-x}Ygexy, Epitaxial Si_{1-y}Cy, Semiconducting Materials, SiGe Heterojunction Bipolar Transistor, Silicon-Germanium Thin Films, Supersaturated Carbon, Suppressed Boron Diffusion

Prices: Print: **US\$ 77.00/ EUR 77.00** Print: 978-0-87849-834-5
eBook Single-User: **US\$ 77.00/ EUR 77.00** eBook: 978-3-0357-0591-1
eBook Multi-User: **US\$ 135.00/ EUR 135.00** 88 pages, 1999

<https://www.scientific.net/978-0-87849-834-5/book>



Bulk Amorphous Alloys - Practical Characteristics and Applications

Volume in the series: 6

Edited by: A. Inoue

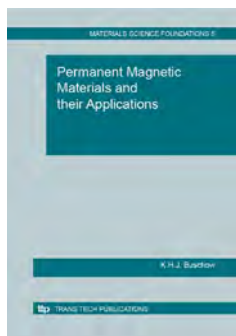
The rapidly growing interest in bulk amorphous alloys has increasingly called for a substantial review to be made of the work published during the last ten years. Such a definitive review has now been published in two volumes.

Topics: Materials Science

Keywords: Bulk Amorphous Alloys, Ceramic Particles, Cold Workability, Corrosion Resistance, Dispersion Strengthening, Hard Magnetic Properties, Magnetostrictive Properties, Micro-Formability, Nanocrystallization Effect, Soft Magnetic Property, Viscous Flow, ZrC Particles

Prices: Print: **US\$ 77.00/ EUR 77.00** Print: 978-0-87849-830-7
eBook Single-User: **US\$ 77.00/ EUR 77.00** eBook: 978-3-0357-0590-4
eBook Multi-User: **US\$ 135.00/ EUR 135.00** 160 pages, 1999

<https://www.scientific.net/978-0-87849-830-7/book>



Permanent Magnetic Materials and their Applications

Volume in the series: 5

Edited by: K.H.J. Buschow

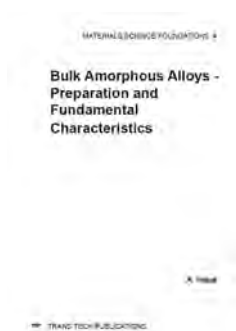
Permanent magnets play an increasingly important role in modern society because they are vital components of numerous domestic and industrial devices. The last few decades have witnessed a quite extraordinary development in the use of hard magnetic materials, especially after the advent of rare earth permanent magnets. The rare earth permanent magnets are unequalled because they combine a high magnetization with an extraordinary magnetic hardness which allows the use of such magnets having the extreme shapes and small dimensions as required in modern devices.

Topics: Materials Science

Keywords: Coercivity, Magnetic Anisotropy, Magnetic Coupling, Magnetic Hardness, Permanent Magnetic Materials, Rare Earth Permanent Magnet, Ternary Carbides

Prices: Print: **US\$ 77.00/ EUR 77.00** Print: 978-0-87849-796-6
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 eBook Multi-User: **US\$ 135.00/ EUR 135.00** 90 pages, 1999

<https://www.scientific.net/978-0-87849-796-6/book>



Bulk Amorphous Alloys - Preparation and Fundamental Characteristics

Volume in the series: 4

Edited by: A. Inoue

Interest in bulk amorphous alloys has increased rapidly throughout the world and these materials have now gained a position of great importance in basic science and engineering materials technology. Bulk amorphous alloys based upon the Zr-Al-Ni-Cu, Zr-(Ti,Nb)-Al-Ni-Cu and Zr-Ti-Ni-Cu-Be systems have already achieved wide commercial success as components of various technical accessories ranging from sporting goods to optical instruments.

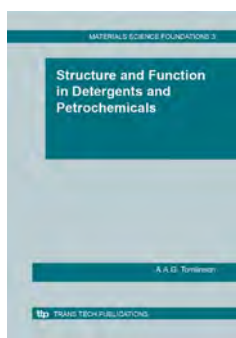
Here is a state-of-the art review on this new group of materials, covering all areas of interest, ranging from the synthesis of these special alloys and their fundamental properties, to their engineering characteristics and applications. This work will therefore be of equal interest to those who wish to become fully acquainted with the subject, and to those who are already actively engaged in the field.

Topics: Materials Science

Keywords: Bulk Amorphous Alloys, Continuous Cooling, Glass Formation, High Glass-Forming Ability, Special Alloys, Structural Relaxation, Thermal Stability

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Modern Zeolites

Volume in the series: 3

Edited by: A.A.G. Tomlinson

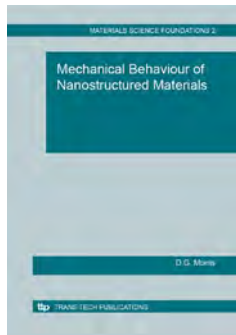
From being mere geological curiosities one hundred years ago, zeolites have progressed to their present status as indispensable absorbents and catalysts both in key oil- refining process technologies and consumer detergent industries - to mention only two. As new families are synthesized, modern structural methods increase our understanding of their formation, structure and function. Furthermore, as new industrial uses have been found, the literature on zeolites, and on related zeotypes, has also grown - particularly over the past decade. Consequently, it is now a truism that one cannot review the subject of zeolites without being considerably selective.

Topics: Materials Science

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Volume in the series: 2

Edited by: D.G. Morris

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Volume in the series: 1

Edited by: H. Bakker

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