Characterisation of Ferroelectric Thin Films
Solutions for Metrology

Ferroelectricity and piezoelectricity are materials properties that find applications in sensors, actuators, and memory devices. There is a growing demand by industry to adapt and integrate piezoelectric materials into ever smaller devices and structures such as piezoelectric ink-jet printing for conventional and direct write printing applications, faster thermal imaging systems, MEMS based micro-pumps for drug delivery, fluid mixing (lab on a chip), acoustic sensing, MEMS based sensors and transducers, memories with better fatigue performance, and more. Such applications development requires the joint development of reliable, robust, accurate and most importantly relevant and applicable measurement and characterisation methods and models. A traditional dependence on low power, bulk characterisation methods is wholly inappropriate because the materials in thin or thick film form are either driven under much higher fields and/or their performance is limited by the very different boundary conditions afforded by their 2D symmetry.

Features
- Only book with a focus on measurement method good practice

Fields of interest
Characterization and Evaluation of Materials; Measurement Science and Instrumentation; Surfaces and Interfaces, Thin Films

Target groups
Academics, industrial scientists and engineers in the space and aerospace, automotive sectors, medical devices, military, chemical industry

Type of publication
Monograph

Diffusion in Condensed Matter
Methods, Materials, Models

This comprehensive, handbook style survey of diffusion in condensed matter gives detailed insight in diffusion as the process of particle transport due to stochastic movement which is understood and presented as a phenomenon of crucial relevance for a large variety of processes and materials. In this book all aspects of theoretical fundamentals, experimental techniques, highlights of current developments and results for solids, liquids and interfaces are presented. Students and scientists in physics, chemistry, materials science and biology will benefit from this detailed compilation, unique for its complete approach to diffusion, covering all topics, including cross-discipline approaches.


Features
- Complete, handbook type survey
- Unique for its complete coverage of all topics in diffusion, including cross-discipline approaches
- New chapters in: case studies in metals and binary alloys, quasielastic neutron scattering, NMR studies interface-dominated and disordered solids, ionic transport in disordered materials, concept of mismatch and relaxation for self-diffusion and conduction

Fields of interest
Condensed Matter Physics; Physical Chemistry; Surfaces and Interfaces, Thin Films

Target groups
Students and scientists in physics, materials science, chemistry, biology

Type of publication
Handbook

Carbon Nanowalls
Synthesis and emerging applications

Representing the first text to cover this exciting new area of research, this book will describe synthesis techniques of CNWs, their characterisation and various expected applications using CNWs. Carbon-nanowalls (CNWs) can be described as two-dimensional graphite nanostructures with edges comprised of stacks of plane graphene sheets standing almost vertically on the substrate. These sheets form a wall structure with a high aspect ratio. The thickness of CNWs ranges from a few nm to a few tens of nm. The large surface area and sharp edges of CNWs may prove useful for a number of applications such as electrochemical devices, field electron emitters, storage materials for hydrogen gas, catalyst support. In particular, vertically standing CNWs with a high surface-to-volume ratio, serve as an ideal material for catalyst support for fuel cells and in gas storage materials.

Features
- First book to extensively cover carbon nanowalls
- Covers their synthesis, characteristics and includes a section on applications and future directions

Fields of interest
Nanotechnology; Power Electronics, Electrical Machines and Networks; Mechanics

Target groups
Researchers and advanced students in the fields of materials science, nanoscience and electrical engineering

Type of publication
Monograph
New Series

Advanced Structured Materials


Common engineering materials reach in many applications their limits and new developments are required to fulfill increasing demands on engineering materials. The performance of materials can be increased by combining different materials to achieve better properties than a single constituent or by shaping the material or constituents in a specific structure. The interaction between material and structure may arise on different length scales, such as micro-, meso- or macroscale, and offers possible applications in quite diverse fields. This book series addresses the fundamental relationship between materials and their structure on the overall properties (e.g., mechanical, thermal, chemical or magnetic etc.) and applications. The topics of Advanced Structured Materials include but are not limited to classical fibre-reinforced composites (e.g. class, carbon or Aramid reinforced plastics) metal matrix composites (MMCs), micro porous composites, micro channel materials, multilayered materials, cellular materials (e.g. metallic or polymer foams, sponges, hollow sphere structures), porous materials, truss structures, nanocomposite materials, biomaterials, nanoporous metals, concrete, coated materials, and smart materials.

M. Kuczma, K. Wilmanski, University of Zielona Gora, Poland (Eds.)

Computer Methods in Mechanics

Lectures of the CMM 2009

Prominent scientists present the latest achievements in computational methods and mechanics in this book. These lectures were held at the CMM 2009 conference.

Features

- Presents full lectures and the most striking contributions of the CMM 2009
- Prominent scientists present the latest achievements in computational methods and mechanics

Contents


Fields of interest

Continuum Mechanics and Mechanics of Materials; Computational Science and Engineering; Structural Mechanics

Target groups

Researchers in structural and mechanical engineering

Type of publication

Monograph

J. Li, Key Lab of Colloid and Interface Science, Institute of Chemistry, Chinese Academy of Sciences (ICCAS), Beijing, China (Ed.)

Nanostructured Biomaterials

Nanostructured materials with designed biofunctions have brought about rapid and significant changes in materials science. "Nanostructured Biomaterials" provides up-to-date reviews of different methods for synthesizing new types of such materials and discusses their cutting-edge technological applications. The reviews mainly focus on potential applications of nanostructured materials in biology and the medical sciences. The book is of general interest to a broad audience of graduate students and researchers active in chemistry, materials science, engineering, biology, and physics.

Dr. Junbai Li is a professor at the National Center for Nanoscience and Technology and the Institute of Chemistry, Chinese Academy of Sciences, China.

Features

- Constitutes a useful state-of-the-art reference by and for forefront researchers
- Also may serve as a reader for graduate-level courses on nanomaterial sciences and biomaterials sciences

Contents

Introduction.- Methods used in Nanostructured Biomaterials synthesis.- Nanotubular Biomaterials.- Polymer vesicles as Biomaterials.- Biomimetic Microcapsules.- Hybrid Nano-biomaterials.- Future Perspectives: Contributions to Nanotechnology and biotechnology.

Fields of interest

Nanotechnology; Biomaterials; Nanochemistry

Target groups

Researchers and professionals, plus graduate students, in the field of nanotechnology

Type of publication

Monograph

Due November 2009

Distribution rights in China: Zhejiang University Press

Jointly published with Zhejiang University Press

2010. Approx. 220 p. 122 illus. in color. (Advanced Topics in Science and Technology in China) Hardcover

- approx. € 159,95 | £144.00
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Due November 2009


- € 129,95 | £117.00
- * € (D) 139,05 | € (A) 142,95 | sFr 202,00

ISBN 978-3-642-05240-7
**Phenolic Resins: A Century of Progress**

With global capacity in excess of 5 million tons annually, phenolic resins are one of the leading thermosetting resins that are used in many diverse industries such as wood adhesives, fiberglass/ mineral wool binder, molded materials for autos/ electronic/electrical industries, brakes, abrasives, foam, coatings/adhesives, laminates, composites, metal castings/refractories, and rubber industry. These phenolic resin business areas are critical to the national economy and general welfare of emerging and developed nations. Although phenolic resins are barely noticed in these applications, it is difficult to imagine their absence since they are vital and not easily replaced by other polymeric materials due to favorable cost/performance characteristics of phenolic resins.

In this new book these application areas are summarized and updated by global phenolic experts that have been engaged daily in these activities.

**Features**
- Application areas are summarized and updated by global phenolic experts
- Features a global perspective of phenolic resins through the participation of international (North America, Europe and Asia) phenolic experts that has been lacking in all previous books related to phenolic resins

**Fields of interest**
Polymer Sciences; Nanotechnology; Condensed Matter Physics

**Target groups**
Resin manufacturers, resin users, marketing and sales personnel, academic interest on a graduate level for polymer chemistry, polymer engineering, industrial engineering, MBA courses related to plastics industry

**Type of publication**
Reference work

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**Theoretical Solid State Physics**

**Volume III: Interaction among Electrons**

**Contents**

**Fields of interest**
Condensed Matter Physics; Physical Chemistry; Materials Science, general

**Target groups**
Students and scientists in physics

**Type of publication**
Monograph

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**Nanoneuroscience**

Structural and Functional Roles of the Neuronal Cytoskeleton in Health and Disease

Nanoneuroscience is the study of computationally relevant biomolecules found inside neurons. Because of recent technological advances at the nanometer scale, scientists have at their disposal increasingly better ways to study the brain and the biophysics of its molecules. This book describes how biomolecules contribute to the operations of synapses and perform other computationally relevant functions inside dendrites. These biomolecular operations exponentially expand the mind-brain computer analogy – endowing each neuron with the processing capability reaching that of a supercomputer. Amazingly, the brain contains hundreds of billions of neurons.

**Features**
- Presents new ideas that address puzzling open questions
- Offers new insights into disorders of mind
- Uses computer simulation to understand neural processing

**From the contents**

**Fields of interest**
Nanotechnology; Neurobiology; Biophysics and Biological Physics

**Target groups**
Scientists, academic libraries, practitioners, graduate students

**Type of publication**
Monograph
W. Zhang, Y. Cai, Zhejiang University, Hangzhou, China

Continuum Damage Mechanics and Numerical Applications

“Continuum Damage Mechanics and Numerical Applications” presents a systematic development of the theory of Continuum Damage Mechanics and its numerical engineering applications using a unified form of the mathematical formulations in anisotropic and isotropic damage models. The theoretical framework is based on the thermodynamic theory of energy and material dissipation and is described by a set of fundamental formulations of constitutive equations of damaged materials, development equations of the damaged state, and evolution equations of micro-structures.

Features
- Uniformly expresses formulations in the matrix form for both anisotropic and isotropic damage models
- Gives many practical applications for the developed theory by offering numerical analyses in different topical areas of engineering
- Equations are developed from the traditional general failure models so they are easily applied and verified in a wide range of engineering practices

Contents

Fields of interest
Continuum Mechanics and Mechanics of Materials; Computational Intelligence

Target groups
Researchers, engineers, teachers, and graduate students in continuum mechanics

Type of publication
Monograph

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