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Metal Matrix Composites

This work focuses on the fundamentals of MMCs for engineers and designers. The new edition addresses new issues and developments in the areas of automotive, aerospace, electronics and consumer applications. These include continuous fiber reinforced MMCs for cables in power transmission, high temperature superconducting wires, particulate MMCs in civilian aircraft and automotive applications, and high volume fraction, high thermal conductivity substrates for electronic packaging. The coverage is thorough and cohesive, and emphasizes the synergistic relationships among processing, structure and properties of metal matrix composites.

Features

► Introduces up-to-date developments of metal matrix composites, particularly in 3D characterization and nano-composites ► Focuses on the synergistic relationships among processing, microstructure, and properties of metal matrix composites ► Describes the latest in applications of common matrix materials

Contents

Preface.- Introduction.- Reinforcements.- Matrix Materials.- Processing.- Interface.- Micromechanics.- Monotonic Behavior.- Cyclic Fatigue.- Creep.- Wear and Corrosion.- Applications.- Author Index.- Subject Index.

Fields of interest

Metallic Materials; Ceramics, Glass, Composites, Natural Materials; Theoretical and Applied Mechanics

Target groups

Research

Product category

Monograph

S. Li, J. Wu, University of Electronic Science and Technology of China, Chengdu, People's Republic of China; **Z. M. Wang**, University of Electronic Science and Technology, Chengdu, People's Republic of China; **Y. Jiang**, University of Electronic Science and Technology of China, Chengdu, People's Republic of China (Eds)

Nanoscale Sensors

Features

► Surveys novel technologies for nanoscale sensors ► Provides the keys to understanding the principles underlying nanoscale sensors ► Written by leading experts in the corresponding research areas ► Describes enabling technologies for critical health, environmental science, and security applications

Contents

Preface.- Chapter 1: Recent progress in the development of novel nanostructured biosensors for detection of water borne contaminants.- Chapter 2: Nanosensors for intracellular Raman studies.- Chapter 3: BioFET-SIM: a Tool for the Analysis and Prediction of Signal Changes in Nanowire Based Field Effect Transistor Biosensors.- Chapter 4: Semiconductor-Based Nanostructures for Photoelectrochemical Sensors and Biosensors.- Chapter 5: ZnO hydrogen nanoscale sensors.- Chapter 6: Recent advances in the design of photodetectors based on thin film and nanostructured ZnO.- Chapter 7: Thin Film Gas Sensors Based on Nanocarbon Materials.- Chapter 8: A Do-it-Yourself (DIY) Guide to using carbon nanotubes for stretchable electronics and sensors.- Chapter 9: Ultra-Sensitive In-Plane Resonant Nano-Electro-Mechanical Sensors.- Index.

Fields of interest

Nanotechnology; Nanotechnology and Microengineering; Optics, Optoelectronics, Plasmonics and Optical Devices

Target groups

Research

Product category

Monograph

A. Saboktakin, School of Higher Technology, Montreal, QC, Canada (Ed)

Problems and Solutions in the Mechanics of Composites

This book starts with a review of composite mechanics and basic behaviour of composite materials. The fundamentals of finite element analysis for composite modeling are presented in the following chapter. The applications of NDT techniques in composite inspection, in particular wave propagation, are scientifically discussed. Then, composites mechanics and NDT inspection are introduced in a question-answer format. In the last chapters, the editors introduce MATLAB codes and simulation results related to wave propagation in composite materials and vibrothermography technique, very useful for aerospace applications.

Features

► Vibrothermography Book is divided in short sections with problems and answers ► Written in a simple language, ideal for students ► Presents composite properties data to help perform calculations easily

Contents

Mechanics of composite materials.- Finite element analysis of composite.- Non-destructive inspection of composite materials.- Problems and solutions.- Sample modeling (including wave propagation and composite testing).

Fields of interest

Ceramics, Glass, Composites, Natural Materials; Structural Materials; Continuum Mechanics and Mechanics of Materials

Target groups

Research

Product category

Monograph

Due December 2013

2nd ed. 2014. XII, 324 p. 263 illus., 89 in color. Hardcover

► *€ (D) 139,09 | € (A) 142,99 | sFr 173,50

► € 129,99 | £117.00

ISBN 978-1-4614-9547-5

Due December 2013

2014. X, 325 p. 168 illus., 105 in color. (Lecture Notes in Nanoscale Science and Technology, Volume 19) Hardcover

Hardcover

► *€ (D) 139,09 | € (A) 142,99 | sFr 173,50

► € 129,99 | £117.00

ISBN 978-3-319-02771-5

Due January 2014

2014. 300 p. (Engineering Materials) Hardcover

► approx. *€ (D) 106,95 | € (A) 109,95 | sFr 133,50

► approx. € 99,95 | £90.00

ISBN 978-3-642-41325-4



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M. Sardela, University of Illinois-Urbana Champaign, Urbana, IL, USA

Practical Materials Characterization

Practical Materials Characterization covers the most common materials analysis techniques in a single volume. It stands as a quick reference for experienced users, as a learning tool for students, and as a guide for the understanding of typical data interpretation for anyone looking at results from a range of analytical techniques. The book includes analytical methods covering micro-structural, surface, morphological, and optical characterization of materials with emphasis on microscopic structural, electronic, biological, and mechanical properties. Many examples in this volume cover cutting-edge technologies such as nanomaterials and life sciences.

Features

► Presents cross-comparison between materials characterization techniques ► Includes clear specifications of strengths and limitations of each technique for specific materials characterization problem ► Focuses on applications and clear data interpretation without extensive mathematics

Contents

Introduction to materials characterization.- X-ray analysis methods.- Atomic Force Microscopy.- Optical characterization of materials.- X-ray photoelectron and Auger electron spectroscopies.- Secondary ion mass spectrometry.- Scanning electron microscopy.- Transmission electron microscopy.- Cross-technique comparison/guide tables of resolution and detection limits.

Fields of interest

Characterization and Evaluation of Materials; Spectroscopy and Microscopy; Mass Spectrometry

Target groups

Professional/practitioner

Product category

Professional book

Due November 2014

2014. 300 p. 150 illus. Hardcover

► approx. *€ (D) 106,95 | € (A) 109,95 | sFr 137,00

► approx. € 99,95 | £86.50

ISBN 978-1-4614-9280-1



9 781461 492801



T. Shin ichi, National Institute for Materials Science, Ibaraki, Japan

Fiber Fuse

Light-Induced Continuous Breakdown of Silica Glass Optical Fiber

This book describes the fiber fuse phenomenon that causes a serious problem for the present optical communication systems. High-power light often brings about catastrophic damage to optical devices. Silica glass optical fibers with ultra-low transmission loss are not the exception. A fiber fuse appears in a heated region of the fiber cable delivering a few watts of light and runs toward the light source destroying its core region. Understanding this phenomenon is a first necessary step in the development of future optical communication systems. This book provides supplementary videos and photographs to help understand what occurs in the fiber, including the classification of its propagation mode and self-pumping effect. These findings are good references for other optical devices exposed to ultra-high power light such as laser emitters.

Features

► Provides a concise introduction into the fiber fuse phenomenon ► Supplementary high-quality photographs and video clips available on extras. springer.com ► Includes anecdotes from the author on what sparked his research interest and motivated his activities

Contents

Impact of Fiber Fuse on Optical Communication.- Fiber Fuse Propagation Modes.- In Situ Observation of Fiber Fuse Propagation.- Self-Pumping Effect During Fiber Fuse Propagation.

Fields of interest

Optical and Electronic Materials; Optics, Optoelectronics, Plasmonics and Optical Devices; Communications Engineering, Networks

Target groups

Research

Product category

Monograph

Due May 2014

2014. 60 p. 17 illus., 5 in color. (NIMS Monographs)

Softcover

► approx. *€ (D) 64,15 | € (A) 65,95 | sFr 80,00

► approx. € 59,95 | £53.99

ISBN 978-4-431-54576-7



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Z. M. Wang, University of Electronic Science and Technology, Chengdu, People's Republic of China (Ed)

FIB Nanostructures

Contents

Preface.- Chapter 1: Focused Ion Beam (FIB) technology for micro and nanoscale fabrications.- Chapter 2: Epitaxial ferroelectric nanostructures fabricated by FIB milling.- Chapter 3: Low current focused-ion-beam milling for freestanding nanomaterial characterization.- Chapter 4: Focused ion beam milling of carbon nanotube yarns and Bucky-papers: Correlating their internal structure with their macro-properties.- Chapter 5: Nanoscale electrical contacts grown by Focused-Ion-Beam (FIB) Induced Deposition.- Chapter 6: Metal induced crystallization of focused ion beam induced deposition for functional patterned ultrathin nanocarbon.- Chapter 7: Deterministic Fabrication of Micro- and Nano-Structures by Focused Ion Beam.- Chapter 8: Application of ion beam processes to scanning probe microscopy.- Chapter 9: Fabrication of needle-shaped specimens containing sub-surface nanostructures for Electron Tomography.- Chapter 10: Fabrication technique of deformation carriers (gratings and speckle patterns) with FIB for micro/nanoscale deformation measurement.- Chapter 11: Controlled Quantum Dot Formation on Focused Ion Beam patterned GaAs Substrates.- Chapter 12: Development of Functional Metallic Glassy Materials by FIB and Nano-imprint Technologies.- Chapter 13: Nanostructured Materials Driven by Dielectrophoresis on Nanoelectrodes Patterned by Focused Ion Beam.- Chapter 14: Focused Ion Beam Assisted Nano-Scale Processing and Thermoelectrical Characterization.- Chapter 15: FIB design for Nanofluidic applications. [...]

Fields of interest

Nanotechnology; Semiconductors; Nanotechnology and Microengineering

Target groups

Research

Product category

Monograph

Due December 2013

2014. X, 590 p. 372 illus., 204 in color. (Lecture Notes in Nanoscale Science and Technology, Volume 20) Hardcover

► *€ (D) 181,89 | € (A) 186,99 | sFr 226,50

► € 169,99 | £153.00

ISBN 978-3-319-02873-6



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Z. M. Wang, University of Electronic Science and Technology, Chengdu, People's Republic of China (Ed)

MoS2

Materials, Physics, and Devices

Features

► Offers comprehensive coverage of novel MoS2 monolayer films and MoS2 nanomaterials ► Provides the keys to understanding the emerging area of MoS2 devices ► Written by leading experts in each research area

Contents

Preface.- Chapter 1: Progress on the Theoretical Study of Two-Dimensional MoS2 Monolayer and Nanoribbon.- Chapter 2: Electronic Structure of Exfoliated MoS2.- Chapter 3: Tunable Electronic and Dielectric Properties of Molybdenum Disulfide.- Chapter 4: Ab initio study on MoS2 and its family: Chemical trend, band alignment, alloying and gap modulation.- Chapter 5: MoS2: A first principles perspective.- Chapter 6: Mechanical properties and electric field screening of atomically thin MoS2 crystals.- Chapter 7: Insights into vibrational and electronic properties of MoS2 using Raman, photoluminescence and transport studies.- Chapter 8: Optical characterization, low-temperature photoluminescence and photocarrier dynamics in MoS2.- Chapter 9: The Application of nano-structure MoS2 materials in energy storage and conversion.- Chapter 10: Valley Polarization in Transition-metal Dichalcogenides by Optical Pumping.- Index.

Fields of interest

Optical and Electronic Materials; Nanoscale Science and Technology; Nanotechnology and Microengineering

Target groups

Research

Product category

Monograph

Z. M. Wang, University of Electronic Science and Technology, Chengdu, People's Republic of China (Ed)

Nanodroplets

Contents

Preface.- Chapter 1: Generation of nanodroplets and Its applications.- Chapter 2: Nanodroplet formations in electrospun fibers of immiscible polymer blends and their effects on crystallization.- Chapter 3: Dynamic Study of Nanodroplet Nucleation and Growth using Transmitted Electrons in ESEM.- Chapter 4: Self-assembly of nanodroplets in nanocomposite materials in Nanodroplets Science and Technology.- Chapter 5: Ordering of Ga Nanodroplets by Low Energy Ion Sputtering.- Chapter 6: Atomistic mechanisms underlying the freezing behavior of metal nanodroplets.- Chapter 7: Dynamics of nanodroplets on structured surfaces.- Chapter 8: Atomistic simulation of nanodroplet collisions with a wall: Fragmentation and impact desolvation of macromolecules.- Chapter 9: Polymer Films with Nanosized Liquid Crystal Droplets: Extinction, Polarization, Phase, and Light Focusing.- Chapter 10: Clusters and nanoparticles in superfluid helium nanodroplets: fundamentals, challenges and perspectives.- Chapter 11: Reactive Dynamics in Confined Water by Reversed Micelles.- Chapter 12: Brownian deposition of nanodroplets and nanofibre growth via "vapor-liquid-solid" route.- Chapter 13: Water Nanodroplets: Molecular Drag and Self-assembly.- Chapter 14: Atomistic pseudopotential theory of droplet epitaxial GaAs/AlGaAs quantum dots.- Chapter 15: Local Droplet Etching – Nanoholes for Quantum Dots and Nanopillars.- Index.

Fields of interest

Nanotechnology; Nanoscale Science and Technology; Nanochemistry

Target groups

Research

Product category

Monograph

Due November 2013

2014. IX, 366 p. 171 illus., 152 in color. (Lecture Notes in Nanoscale Science and Technology, Volume 21) Hardcover

► *€ (D) 106,99 | € (A) 109,99 | sFr 133,50

► € 99,99 | £90.00

ISBN 978-3-319-02849-1



9 783319 028491



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Due December 2013

2014. XII, 428 p. 197 illus., 124 in color. (Lecture Notes in Nanoscale Science and Technology, Volume 18) Hardcover

► *€ (D) 139,09 | € (A) 142,99 | sFr 173,50

► € 129,99 | £117.00

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