Thermal Analysis of Polymeric Materials—Bernard Wunderlich 2005-04-04 "Thermal Analysis of Polymeric Materials" systematically treats macroscopic measurements by thermal analysis and the quantitative link to microscopic, molecular structure and mobility. Invariable and irreversible thermodynamics, kinetics, quantum mechanics, and statistical thermodynamics are the roots of the described thermal analysis. The book aims to broaden readers' understanding of materials and the connection of flexible macromolecules (polymers) to small molecules and rigid macromolecules (minerals, salts, and metals). An effort is made to describe how the long, flexible chains fit into their small phases which are characterized as microwaves or nanoparticles. Their order ranges from amorphous to mesophase-like and crystalline. Ultimately, it is shown that the basic structure-property-processing triangle is connected to the better-known types of molecules and their common macroscopic phases.

Encyclopedia of Polymer Composites—Michael Leckband 2010 In the last several years, polymer composites have been used heavily in the construction sector, such as to repair or design buildings and bridges, strengthen structures and as stand-alone components. About 30% of all polymers produced each year are used in the civil engineering and building industries. In addition to construction, polymer composites are also used in transportation (moulded parts, fuel and gas tanks), satellite systems, and aircraft and spacecraft, marine, biomedical (dental prostheses, medical devices), electronics, and recreation industries. Such applications associated with polymer composites, in addition to its performance and applications, are continually being researched. Some topics examined in this book include the durability of the base components of FRP (fiber-reinforced polymer), specifically designed for civil engineering industry. The most common environmental agents, mostly responsible for the deterioration of the materials performance are also discussed. Furthermore, the interfacial adhesion between nanotubes and polymers and the different strategies to promote adhesion are explored to help researchers understand the potential and challenges faced by scientists and engineers regarding the use of carbon nanotubes as a reinforcement phase in nanocomposites. This book also reviews the state-of-the-art of synthetic foams and shape memory polymers. The underlying principle for self-healing is also analyzed. Other chapters examine the processing of polymers into amorphous materials using polymer/clay nanotechnology, the various methods of synthesis for polyurethane-based nanoparticle/blend materials, and the steps towards understanding the complex relationships between specific factors in the production of plastic composites.

Concise Encyclopedia of Composite Materials—A. Kelly 2012-12-02 The Concise Encyclopedia of Composite Materials, first published as a hardbound edition in 1989, has been updated and revised and is now available as a paperbound for individual scientists requiring a fundamental reference source for this dynamic field. Since 1989 research involving composite materials has advanced rapidly and this revised edition reflects those changes with the latest articles on recent work on nanocomposites, smart composite materials systems, and metallic multilayers. The 67 articles included in this revised edition are presented in alphabetical order and provide an overview of the present to future applications. Every article is extensively cross-referenced and includes a full bibliography. The volume contains over 250 photographs, drawings and tables as well as exhaustive subject and author indexes. The comprehensive breadth of coverage of the field of composite materials makes this volume an irreplaceable source of reference for materials scientists and mechanical engineers involved in industrial and academic research into the fabrication, properties and applications of composite materials.

Bio-Based Polymers for Engineered Green Materials—Guilherme Toroni 2020-05-28 With daily signals, Nature is communicating so us that its unconscious wisdom, its enigmatic nature, and its interaction with the world's leading scientists. The result is a three-volume, comprehensive collection of the most important data, concepts and studies published in the field. This title is clearly structured in thematic sections, making it an invaluable resource for researchers in the fields of materials science, energy, engineering, chemistry and physics, and from both industry and academia. Provides a one-stop resource on current composite materials research, along with insights into future directions in the field. Materially organized, with articles split into sections on key topics and clearly cross-referenced to allow students, researchers and professionals to find relevant information quickly and easily. Written by academics and practitioners from various fields and regions, thus ensuring that the book's content is easily understood by, and applicable to, a large audience

Applied Polymer Science: 21st Century—C. Craver 2000-12-19 With daily signals, Nature is communicating so us that its unconscious wisdom, its enigmatic nature, and its interaction with the world's leading scientists. The result is a three-volume, comprehensive collection of the most important data, concepts and studies published in the field. This title is clearly structured in thematic sections, making it an invaluable resource for researchers in the fields of materials science, energy, engineering, chemistry and physics, and from both industry and academia. Provides a one-stop resource on current composite materials research, along with insights into future directions in the field. Materially organized, with articles split into sections on key topics and clearly cross-referenced to allow students, researchers and professionals to find relevant information quickly and easily. Written by academics and practitioners from various fields and regions, thus ensuring that the book's content is easily understood by, and applicable to, a large audience

Concise Encyclopedia of Advanced Ceramic Materials—R.W. Cahn 2011-01-22 To use materials effectively, their composition, degree of perfection, physical and mechanical characteristics, and microstructures must be accurately determined. This concise encyclopedia covers the wide range of characterization techniques necessary to characterize these materials, as not only connected to the identification of specific materials such as polymers, metals, ceramics and semiconductors but also techniques which can be applied to materials in general. The techniques described cover bulk methods, and also a number of specific methods to study the topology and composition of surface and near-surface regions. These techniques range from the well-established and traditional to the very latest including: atomic force microscopy; confocal optical microscopy; gamma ray diffractometry; thermal wave imaging; x-ray diffraction and time-resolved techniques. This unique concise encyclopedia comprises 116 articles by leading experts in the field from around the world to create the ideal guide for materials scientists, chemists and engineers to understand the various aspects of materials characterization. For over 540 illustrations, extensive cross-referencing, approximately 900 references, and a detailed index, this concise encyclopedia will be a valuable asset to any materials science collection.

Automotive Plastics and Composites—Joseph P. Greene 2021-06-23 Automotive Plastics and Composites: Materials and Processing is an essential guide to the use of plastic and polymer composites in automotive applications, whether in the exterior, interior, under-the-hood, or powertrain, with a focus on materials, processes, and automotive processors. This book covers the entire range of applications, discussing polymer materials and structures, mechanical, chemical, and physical properties, rheology, and flow analysis. In the second part of the book, each chapter is dedicated to a category of material, and considers the manufacture, processing, properties, shrinkage, and possible applications, in each case. Two chapters on polymer processing provide detailed information on both closed-mold and open-mold processing. The final chapters explain other key aspects, such as recycling and sustainability, design principles, testing, and further trends. This book is an ideal reference for plastics engineers, product designers, technicians, scientists, and R&D professionals who are looking to develop materials, components, or products for automotive applications. The book also intends to guide researchers, scientists, and advanced students in plastics engineering, polymer processing, and materials science and engineering. Analyzes mechanical, chemical, physical, and thermal properties, enabling the reader to select the appropriate material for specific applications. Explains polymer processing, with thorough coverage of operations across both closed-mold and open-mold processing. Provides systematic coverage of materials, including commodity, engineering thermoplastics, bio-based plastics, thermosets, composites, elastomers, and 3D-printed plastics.

Concise Encyclopedia of Composites—J. Broek 2012-12-02 Advanced composites cover a wide range of materials which are ceramic by nature but have been developed in response to specific requirements. This encyclopedia collects together 167 articles to provide an up-to-date account of the advances to the construction sector, such as to repair or design buildings and bridges, strengthen structures and as stand-alone components. About 30% of all polymers produced each year are used in the civil engineering and building industries. In addition to construction, polymer composites are also used in transportation (moulded parts, fuel and gas tanks), satellite systems, and aircraft and spacecraft, marine, biomedical (dental prostheses, medical devices), electronics, and recreation industries. Such applications associated with polymer composites, in addition to its performance and applications, are continually being researched. Some topics examined in this book include the durability of the base components of FRP (fiber-reinforced polymer), specifically designed for civil engineering industry. The most common environmental agents, mostly responsible for the deterioration of the materials performance are also discussed. Furthermore, the interfacial adhesion between nanotubes and polymers and the different strategies to promote adhesion are explored to help researchers understand the potential and challenges faced by scientists and engineers regarding the use of carbon nanotubes as a reinforcement phase in nanocomposites. This book also reviews the state-of-the-art of synthetic foams and shape memory polymers. The underlying principle for self-healing is also analyzed. Other chapters examine the processing of polymers into amorphous materials using polymer/clay nanotechnology, the various methods of synthesis for polyurethane-based nanoparticle/blend materials, and the steps towards understanding the complex relationships between specific factors in the production of plastic composites.


International Encyclopedia of Composites—Stuart M. Lee 1990 Includes almost all essential areas necessary to understand this group of materials in detail, and how to use them for different applications. Includes special types of composites used as engineering materials, the behavior of composite materials under different types of loading conditions, composites with special property profiles, and design aspects of composite materials.

An Introduction to Polymer Physics—David W. Bower 2002-05-30 Publisher Description

Absorbable and Biodegradable Polymers—Shadly W. Shadly 2003-10-17 Interest in biodegradable and absorbable polymers is growing rapidly as better characterization techniques are developed. Applications of this text illustrate creative approaches to custom designing unique, fiber-forming materials for equally unique applications. It includes an example of the development and application of a new absorbable.

Encyclopedia of Biomedical Polymers and Biopolymeric Materials, 11 Volume Set—Humaan Mehta 2015-04-28 The Encyclopedia of Biomedical Polymers & Biopolymeric Materials presents state-of-the-art research and development on the applications of polymeric materials and their derivatives. This five volume work includes an insight of a large number of contributors from around the world who offer a broad-based perspective on a multitude of topics. Authoritative, dynamic, and comprehensive, this multi-volume reference covers the broad subject area of polymer applications in the medical field, providing readers with an enriching experience and targeted knowledge in this evolving area. The materials presented convey important overviews to help stimulate further advancements in all areas of biomaterials and biomedical polymers. Additionally, they address and identify new breakthroughs and emerging technologies. Designed for novices to experienced researchers, the encyclopedia caters to engineers and scientists (polymer and materials scientists, biomedical engineers, biochemists, molecular biologists, macromolecular chemists), pharmacists, doctors, cardiovascular and plastic surgeons, and students, as well as general readers in academia, industry, research institutions, etc. It is envisioned that the encyclopedia will serve as the most respected reference work on the application of polymers in the medical field.

Handbook of Polyolefins—Cornelia Vasic 2000-06-21 A handbook on polyolefins. This second edition includes new material on the structure, morphology and properties of polyethylene (PE) synthesis. It focuses on synthetic advances, the use of additives, special coverage of PPO blends, composites and foils, and surface treatments. It also addresses the problem of interfacial and superficial phenomena.

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