

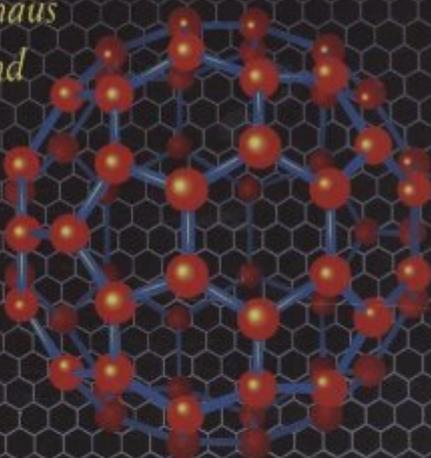
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Science of Fullerenes and Carbon Nanotubes

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Academic Press

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Science of Fullerenes and Carbon Nanotubes-M. S.

Dresselhaus 1996-03-20 The discovery of fullerenes (also known as buckyballs) has generated tremendous excitement and opened up a new field of carbon chemistry.

As the first book available on this topic, this volume will be a landmark reference in the field. Because buckyballs are essentially closed hollow cages made up of carbon atoms, they can be manipulated in a variety of ways to yield never-before-seen materials. The balls can, for instance, be doped with

atoms or pulled out into tubules and filled with lead to provide properties of high-temperature superconductivity.

Researchers can now create their own buckyballs in a process that is almost as simple as making soot, making this research as inexpensive as it is exotic (which has doubtless contributed to its popularity). Researchers anticipate that fullerenes will offer boundless opportunities in the development of new products, drugs and materials. Science of Fullerenes and Carbon Nanotubes introduces materials scientists, chemists, and solid state physicists to the field of fullerenes, and discusses the unique properties and applications, both current and future, of all classes of fullerenes. Key Features * First comprehensive resource on fullerenes and their applications * Provides an introduction to the topic * Presents an extensive discussion of current and future applications of Fullerenes * Covers all classes of fullerenes

Science of Fullerenes and Carbon Nanotubes-M. S.

Dresselhaus 1996 The discovery of Fullerenes (also known as buckyballs) has generated much excitement and opened up a new field of carbon chemistry. Because buckyballs are essentially closed hollow cages made up of carbon atoms, they can be manipulated in a variety of ways to yield never-before-seen materials. The balls can, for instance, be doped with atoms or pulled out into tubules and filled with lead to provide properties of high-temperature superconductivity.

Researchers can create their own buckyballs in a process that is almost as simple as making soot, making this research inexpensive. Researchers anticipate that Fullerenes will offer many opportunities in the development of new products, drugs and materials.

Carbon Nanotubes-Ado Jorio
2007-12-18 Building on the success of its predecessor, Carbon Nanotubes: Synthesis,

Structure, Properties and Applications, this second volume focuses on those areas that have grown rapidly in the past few years. Contributing authors reflect the multidisciplinary nature of the book and are all leaders in their particular areas of research. Among the many topics they cover are graphene and other carbon-like and tube-like materials, which are likely to affect and influence developments in nanotubes within the next five years. Extensive use of illustrations enables you to better understand and visualize key concepts and processes.

Handbook of Carbon, Graphite, Diamonds and Fullerenes-Hugh O. Pierson 1993 This book is a review of the science and technology of the element carbon and its allotropes: graphite, diamond and the fullerenes. This field has expanded greatly in the last three decades stimulated by many major discoveries such as carbon fibers, low-pressure diamond and the fullerenes. These carbon

materials are very different in structure and properties. Some are very old (charcoal), others new (the fullerenes). They have different applications and markets and are produced by different segments of the industry.

The Physics of Fullerene-Based and Fullerene-Related Materials-W.

Andreoni 2012-12-06 Krättschmer and Huffman's revolutionary discovery of a new solid phase of carbon, solid C60, in 1990 opened the way to an entire new class of materials with physical properties so diverse that their richness has not yet been fully exploited. Moreover, as a by-product of fullerene research, carbon nanotubes were later identified, from which novel nanostructures originated that are currently fascinating materials scientists worldwide. Rivers of words have been written on both fullerenes and nanotubes, in the form of journal articles, conference proceedings and books. The present book offers, in a concise and self-

contained manner, the basics of the science of these materials as well as detailed information on those aspects that have so far been better explored. Structural, electronic and dynamical properties are described as obtained from various measurements and state-of-the-art calculations. Their interrelation emerges as well as their possible dependence on, for example, preparation conditions or methods of investigation. By presenting and comparing data from different sources, experiment and theory, this book helps the reader to rapidly master the basic knowledge, to grasp important issues and critically discuss them. Ultimately, it aims to inspire him or her to find novel ways to approach still open questions. As such, this book is addressed to new researchers in the field as well as experts.

Medicinal Chemistry and Pharmacological Potential of Fullerenes and Carbon Nanotubes-Franco Cataldo
2008-09-08 Fullerenes and nanotubes are two classes of

carbon structures or allotropes, which were discovered about 17 years ago. Since that time, many chemical derivatives have been synthesized using fullerenes and nanotubes as building blocks. Particularly promising was the theory that the chemical properties of fullerenes, and certain derivatives, made them likely candidates for anticancer drugs, inhibitors of viruses such as HIV, or even as anti-bacterials. Their cytotoxicity can also be controlled by specific circumstances. In addition, the functionalization of nanotubes has not only produced relatively simple derivatives, but also complex hybrids with biological macromolecules, which show unique supramolecular architecture and which are promising in many medical applications. The application of fullerenes and nanotubes in medicine is at the frontier of our knowledge, thus the work in this field represents the basis for future novel developments.

The Fullerenes-H.W. Kroto
2012-12-02 Until recently, the

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element carbon was believed to exhibit only two main allotropic forms, diamond and graphite. Research in the US and Europe has now confirmed the existence of a third previously unknown form - buckminsterfullerene (C₆₀) and its relatives, the fullerenes (C₂₄, C₂₈, C₃₂, C₇₀ etc). The story of fullerene chemistry, physics and materials science began in 1985, almost twenty years after the existence of a spherical carbon cluster was first considered. In September 1985 a joint Sussex/Rice Universities team including Kroto, Heath, O'Brien, Curl and Smalley used a powerful mass spectrometric technique to identify the C₆₀ species, and proposed a spherical structure and the name buckminsterfullerene. It was not, however, until Krätschmer and Huffman reported the isolation of crystals of C₆₀ in 1990 that the closed cage structure of C₆₀ could be confirmed. The Fullerenes documents the work leading up to 1990 and more recent developments in the field of fullerene research and will serve as an indispensable reference tool

for all workers in this area.

Supramolecular Chemistry of Fullerenes and Carbon Nanotubes

Nazario Martin

2012-05-21

Collating our current knowledge and the latest developments for enabling breakthrough discoveries, this book focuses on the synthesis and applications of materials that are based on supramolecular assemblies of carbon nanostructures, with an emphasis on fullerenes and nanotubes. In so doing, it provides readers with an overview of the different types of supramolecular architectures, accentuating the outstanding geometrical, electronic and photophysical properties of the building blocks and the resulting structures. It makes use of basic concepts and real-life applications -- from simple syntheses to complex architectures, from instructive examples to working experimental procedures, and from photophysics to solar cells. A large part of each chapter is devoted to the methods and possibilities of

controlling and tuning these molecular assemblies in order to obtain working devices. Fascinating reading for materials scientists, organic chemists, molecular physicists, and those in the semiconductor industry.

Fragments of Fullerenes and Carbon Nanotubes-

Lawrence T. Scott 2011-11-08

This book is the first of its kind to reflect upon the intense and rapidly growing interest in open geodesic polyaromatic molecules, specifically focusing on their synthesis and reactivity in metal binding reactions. The book broadly covers all aspects related to the fullerene fragment chemistry: current synthetic techniques, description of the available members of this new family (which has grown to more than two dozens members, with none being available commercially), molecular geometry and trends in the solid state packing, as well as extensions into physical properties and new bucky-bowl-based molecules and materials. It covers fundamental research related

to a new class of hydrocarbons, namely open geodesic polyarenes that map onto the surfaces of fullerenes (and referred to as fullerene fragments or buckybawls).

Fullerenes-Elena Sheka

2011-02-16 At the interface between chemistry, biology, and physics, fullerenes were one of the first objects to be dissected, scanned, and studied by the modern multi-specialty biotech community and are currently thriving in both research and practical application. Other members of the sp^2 nanocarbon family, such as nanotubes and graphene, are currently bein

Fullerenes and Relative Materials-Natalia Kamanina

2018-04-25 In the period of rapid and intensive development of general electronics, this book entitled Fullerenes and Relative Materials - Properties and Applications is quite systematic and useful. It considers some aspects on synthesis, structural, vibrational, tribology, and

optical properties of the fullerenes and relative materials. Some parts of the book present the specific area of the applications of the studied nanostructures. The book contains eight chapters. The special approach and interesting results on the unique properties of the materials studied as well as the different areas of their applications in general optoelectronics, solar energy and gas storage, laser and display, and biomedicine are shown. It is important for education process and for the civil and special device operations.

Fullerenes-Fernando Langa
2007-01-01 The discovery of caged carbon structures, in 1985, established a whole new field of carbon chemistry. Unlike graphite and diamond, these structures known as fullerenes are finite in structure and are relevant to a wide variety of fields including supramolecular assemblies, nanostructures, optoelectronic devices and a whole range of biological activities. Fullerenes: Principles and Applications

discusses all aspects of this exciting field. Sections include: the basic principles for the chemical reactivity of fullerenes, electrochemistry, light induced processes, fullerenes for material sciences, fullerenes and solar cells, biological applications and multifunctional carbon nanotube materials. Written by leading experts in the field the book summarises the basic principles of fullerene chemistry but also highlights some of the most remarkable advances that have occurred in recent years. Fullerenes: Principles and Applications will appeal to researchers in both academia and industry.

The Chemistry of Fullerenes-Roger Taylor
1995 The closed-cage carbon molecules known as fullerenes provide an entirely new branch of chemistry, materials science, and physics. Fullerene research is now engaging the frenetic attention of thousands of scientists. Initially, the chemistry was relatively slow to develop due to the low availability of material, and the need for state-of-the-art

instrumentation for product analysis. This research area is now very definitely up-and-running, and will soon become the main focus of attention in the fullerene field. The number of published papers already runs into hundreds, and the main features of fullerene reactivity have been established. This book describes all of the known types of reactions as well as the means of production, the purification, and the properties of fullerenes.

The Science and Technology of Carbon Nanotubes

T. Yamabe
1999-08-17 Carbon Nanotubes (CNT) is the material lying between fullerenes and graphite as a new member of carbon allotropes. The study of CNT has gradually become more and more independent from that of fullerenes. As a novel carbon material, CNTs will be far more useful and important than fullerenes from a practical point of view, in that they will be directly related to an ample field of

nanotechnology. This book presents a timely, second-generation monograph covering as far as practical, application of CNT as the newest science of these materials. Most updated summaries for preparation, purification and structural characterisation of single walled CNT and multi walled CNT are given. Similarly, the most recent developments in the theoretical treatments of electronic structures and vibrational structures are covered. The newest magnetic, optical and electrical solid-state properties providing a vital base to actual application technologies are described. Explosive research trends towards application of CNTs, including the prospect for large-scale synthesis, are also introduced. It is the most remarkable feature of this monograph that it devotes more than a half of the whole volume to practical aspects and offers readers the newest developments of the science and technological aspects of CNTs.

Fullerene Nanowhiskers

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Kun'ichi Miyazawa
2016-04-19 This book provides detailed knowledge about fullerene nanowhiskers and the related low-dimensional fullerene nanomaterials. It introduces tubular nanofibers made of fullerenes, fullerene nanotubes, and single crystalline thin film made of C60, called fullerene nanosheet. Since the discovery of C60 in 1985, various fullerene molecules, including higher fullerenes such as C70, endohedral fullerenes, and fullerene derivatives have been synthesized. In 2001, a new form of crystalline carbon nanofiber, fullerene nanowhisker, was discovered. This book is the first publication featuring the fullerene nanowhiskers made of C60, C70, and C60 derivatives. The synthetic method (liquid-liquid interfacial precipitation method) and the physical and chemical properties such as electrical, mechanical, optical, magnetic, thermodynamic, and surface properties are shown for the fullerene nanowhiskers, including their electronic device application.

Making and Exploiting Fullerenes, Graphene, and Carbon Nanotubes

Massimo Marcaccio 2014-08-12 The series Topics in Current Chemistry presents critical reviews of the present and future trends in modern chemical research. The scope of coverage is all areas of chemical science including the interfaces with related disciplines such as biology, medicine and materials science. The goal of each thematic volume is to give the non-specialist reader, whether in academia or industry, a comprehensive insight into an area where new research is emerging which is of interest to a larger scientific audience. Each review within the volume critically surveys one aspect of that topic and places it within the context of the volume as a whole. The most significant developments of the last 5 to 10 years are presented using selected examples to illustrate the principles discussed. The coverage is not intended to be an exhaustive summary of the field or include large

quantities of data, but should rather be conceptual, concentrating on the methodological thinking that will allow the non-specialist reader to understand the information presented. Contributions also offer an outlook on potential future developments in the field. Review articles for the individual volumes are invited by the volume editors. Readership: research chemists at universities or in industry, graduate students.

Fullerenes-Karl M. Kadish
2000-07-06 Fullerenes-a guide to the current state of knowledge in the field The last decade has seen an explosion of research into the chemical and physical properties of a promising new class of carbon-based materials known as fullerenes. Karl Kadish and Rodney Ruoff, two highly recognized leaders in the fullerene and nanotube research community, edit a comprehensive and much-needed survey of this important and rapidly evolving field. Contributions by experts in diverse areas of

chemistry, physics, pharmacology, materials science, and chemical engineering provide an excellent introduction to fullerenes and highlight their considerable potential in such cutting-edge applications as semiconductor materials, new pharmaceutical compounds, and polymers. From the electrochemistry of fullerenes to molecular and solid C₃₆, this book offers a remarkably fresh and authoritative look at some of the hottest research topics today, including: * Organic functionalization of fullerenes * Photophysical properties of different types of fullerenes * Polyfunctional polymer derivatives of fullerenes * The theory and production of endohedral metallofullerenes * Fullerene surface interactions * Superconductivity in fullerenes * Synthesis of materials incorporated within carbon nanotubes

Natural Fullerenes and Related Structures of Elemental Carbon-Frans J.M. Rietmeijer 2007-01-31
Observational, experimental

and analytical data show that C60, larger fullerenes, and related structures of elemental carbon exist in interstellar space, meteorites, and on Earth and are associated with meteorite in impact events and in carbon-rich environments such as coals (shungite) and bitumen. The existence of natural fullerenes is at best contested and incompletely documented; realistically it is still controversial. Their presence in astronomical environments can be experimentally constrained but observationally they remain elusive. Fullerenes formation in planetary environments is poorly understood. They survived for giga-years when the environmental conditions were exactly right but even then only a fraction of their original abundance survived. Natural fullerenes and related carbon structures are found in interstellar space, in carbonaceous meteorites associated with giant meteorite impacts (including at the Cretaceous-Tertiary boundary) as well as in soot, coal and natural bitumen. This book provides an up-to-date

summary of the state of knowledge on natural fullerenes occurrences and the laboratory techniques used to determine their presence at low concentration in rock samples. It demonstrates that natural fullerenes exist and should be searched for in places not yet considered such as carbon-containing deep-seated crustal rocks. Natural Fullerenes and Related Structures of Elemental Carbon is written for professional astronomers, meteoriticists, earth and planetary scientists, biologists and chemists interested in carbon and hydrocarbon vapor condensation. It is an invaluable resource for practicing research scientists and science teachers in Earth and Planetary Science, Astronomy and Carbon Science.

Advances in Carbon Nanomaterials-Nikos Tagmatarchis 2012-05-08 This book covers the nomenclature and modeling of carbon nanomaterials, includes examples of surfaces and thin films of fullerenes, and

examines the morphology and structure of carbon nanotubes and the characterization of peapod materials with the aid of transmission electron microscopy. It also presents electro-optical properties and self-assembly and enrichment in carbon nanotubes, followed by strategies for the chemical functionalization of carbon nanohorns and endohedral metallofullerenes. Finally, the applications of endohedral metallofullerenes in quantum computing and of functionalized carbon nanotubes in medicine conclude this fascinating overview of the field.

Fullerenes-Andreas Hirsch 2006-03-06 In this handbook, the leading experts in the field presents important and fundamental aspects of the organic and organometallic chemistry of fullerenes. Naturally they also cover the applications in material and medicinal science for these fascinating molecules. Completely self-contained, the book is logically arranged such that information is easy to retrieve, and the style lends itself to effortless reading and

to learning more about the chemical properties of this family of molecules. A definitive "must" for everyone working in this ever-expanding sphere.

Fullerenes, Graphenes and Nanotubes-Alexandru Mihai Grumezescu 2018-05-28 Fullerenes, Graphenes and Nanotubes: A Pharmaceutical Approach shows how carbon nanomaterials are used in the pharmaceutical industry. While there are various books on the carbonaceous nanomaterials available on the market, none approach the subject from a pharmaceutical point-of-view. In this context, the book covers different applications of carbonaceous nanomaterials. Chapters examine different types of carbon nanomaterials and explore how they are used in such areas as cancer treatments, pulse sensing and prosthetics. Readers will find this book to be a valuable reference resource for those working in the areas of carbon materials, nanomaterials and pharmaceutical science.

Explains how the unique properties of carbon-based nanomaterials allow them to be used to create effective drug delivery systems Covers how carbon-based nanomaterials should be prepared for use in pharmaceutical applications Discusses the relative toxicity of a range of carbon-based nanomaterials Considers the safety of their use in different types of drugs

Physics and Chemistry of the Fullerenes-K. Prassides
2012-12-06 In September 1985, in an attempt to simulate the chemistry in a carbon star, Harry Kroto, Bob Curl and Richard Smalley set up a mass spectrometry experiment to study the plasma produced by focusing a pulsed laser on solid graphite. Serendipitously, a dominant 720 amu mass peak corresponding to a C₆₀ species was revealed in the time-of-flight mass spectrum of the resulting carbon clusters. It was proposed that this C₆₀ cluster had the closed cage structure of a truncated icosahedron (a soccerball) and was named

Buckminsterfullerene because geodesic dome concepts, pioneered by the architect Buckminster Fuller, played an important part in arriving at this solution. The signal for a C₇₀ species (840 amu) , proposed to have the ellipsoidal shape of a rugbyball, was also prominent in the early experiments. Five years later, the seminal work of the Sussex! Rice collaboration was triumphantly confirmed as Wolfgang Krlitschmer and Donald Huffman succeeded in producing, and separating, bulk crystalline samples of fullerene material from arc-processed (in an inert gas atmosphere) carbon deposits. From then onwards, fullerene research continued, and still proceeds, at an exhilarating pace. The materials excited the imagination of many diverse classes of scientists, resulting in a truly interdisciplinary field. Many of our old, seemingly well-founded, preconceptions in carbon science had to be radically altered or totally abandoned, as a new round world of chemistry, physics and materials science began to unfold.

Carbon Nanotechnology-

Liming Dai 2006-04-18

Nanotechnology is no longer a merely social talking point and is beginning to affect the lives of everyone. Carbon nanotechnology as a major shaper of new nanotechnologies has evolved into a truly interdisciplinary field, which encompasses chemistry, physics, biology, medicine, materials science and engineering. This is a field in which a huge amount of literature has been generated within recent years, and the number of publications is still increasing every year. Carbon Nanotechnology aims to provide a timely coverage of the recent development in the field with updated reviews and remarks by world-renowned experts. Intended to be an exposition of cutting-edge research and development rather than a kind of conference proceeding, Carbon Nanotechnology will be very useful not only to experienced scientists and engineers, who wish to broaden their knowledge of the wide-

ranging nanotechnology and/or to develop practical devices, but also to graduate and senior undergraduate students who look to make their mark in this field of the future. · A comprehensive treatment from materials chemistry and structure-property to practical applications · Offers an in-depth analysis of various carbon nanotechnologies from both fundamental and practical perspectives · An easily accessible assessment of the materials properties and device performances based on all of the major classes of carbon nanomaterials, including: carbon fiber; diamond; C60; and carbon nanotubes · A concise compilation of the practical applications of carbon nanotechnologies from polymer-carbon nanocomposites to sensors, electron emitters, and molecular electronics

An Atlas of Fullerenes-P. W. Fowler 2006 An introduction to the current state of theory in a new and lively field, this volume offers both students and researchers a practical

guide. It features a comprehensive set of pictures of fullerene structures and tabulates their properties. In addition, it lists a computer program that will extend the tables as needed. Seven chapters of descriptive material precede over 200 pages of tables with corresponding diagrams and serve as a self-contained introduction. Topics include fullerene cages, electronic structure, steric strain, symmetry and spectroscopy, fullerene isomerization, and carbon gain and loss. Each chapter concludes with references and notes.

Frontiers of Multifunctional Nanosystems-Eugenia V. Buzaneva 2002-05-31
Proceedings of the NATO Advanced Research Workshop on Frontiers in Molecular-Scale Science and Technology of Fullerenes, Nanotube, Nanosilicon, Biopolymer (DNA, Protein) Multifunctional Nanosystems, Kyiv, Ukraine, 9-12 September 2001

The Fullerenes-Royal Society (Great Britain) 1993-09-09 This book presents papers from key scientists in the Buckminsterfullerene story.

An Introduction to Graphene and Carbon Nanotubes-John E. Proctor 2017-02-03 Carbon nanotubes and graphene have been the subject of intense scientific research since their relatively recent discoveries. This book introduces the reader to the science behind these rapidly developing fields, and covers both the fundamentals and latest advances. Uniquely, this book covers the topics in a pedagogical manner suitable for undergraduate students. The book also uses the simple systems of nanotubes and graphene as models to teach concepts such as molecular orbital theory, tight binding theory and the Laue treatment of diffraction. Suitable for undergraduate students with a working knowledge of basic quantum mechanics, and for postgraduate researchers

commencing their studies into the field, this book will equip the reader to critically evaluate the physical properties and potential for applications of graphene and carbon nanotubes.

Hydrogen Materials Science and Chemistry of Carbon Nanomaterials-T.

Nejat Veziroglu 2007-05-16

This book considers the various advanced hydrogen materials and technologies of their synthesis. It presents the consideration of the physics, chemistry, thermodynamics and kinetics of processes of energy conversion, which occur at hydrogen production, storage, transportation and with its use. It also discusses the pioneering attempts to transform motor transport, airplanes, domestic technics, illumination and industrial manufacture of hydrogen fuel.

Carbon Nanomaterials Sourcebook-Klaus D. Sattler
2016-04-06 The Carbon Nanomaterials Sourcebook contains extensive, interdisciplinary coverage of

carbon nanomaterials, encompassing the full scope of the field—from physics, chemistry, and materials science to molecular biology, engineering, and medicine—in two comprehensive volumes. Written in a tutorial style, this second volume of the sourcebook: Focuses on nanoparticles, nanocapsules, nanofibers, nanoporous structures, and nanocomposites Describes the fundamental properties, growth mechanisms, and processing of each nanomaterial discussed Explores functionalization for electronic, energy, biomedical, and environmental applications Showcases materials with exceptional properties, synthesis methods, large-scale production techniques, and application prospects Provides the tools necessary for understanding current and future technology developments, including important equations, tables, and graphs Each chapter is dedicated to a different type of carbon nanomaterial and addresses three main areas: formation, properties, and applications. This setup allows

for quick and easy search, making the Carbon Nanomaterials Sourcebook: Nanoparticles, Nanocapsules, Nanofibers, Nanoporous Structures, and Nanocomposites a must-have reference for scientists and engineers.

Materials Science and Engineering of Carbon: Fundamentals

Michio Inagaki 2014-06-06 Materials Science and Engineering of Carbon: Fundamentals provides a comprehensive introduction to carbon, the fourth most abundant element in the universe. The contents are organized into two main parts. Following a brief introduction on the history of carbon materials, Part 1 focuses on the fundamental science on the preparation and characterization of various carbon materials, and Part 2 concentrates on their engineering and applications, including hot areas like energy storage and environmental remediation. The book also includes up-to-date advanced information on such newer carbon-based

materials as carbon nanotubes and nanofibers, fullerenes and graphenes. Through review on fundamental science, engineering and applications of carbon materials Overview on a wide variety of carbon materials (diamond, graphite, fullerene, carbon nanotubes, graphene, etc.) based on structure and nanotexture Description on the preparation and applications of various carbon materials, in the relation to their basic structure and properties

Fullerenes and Related Structures

Andreas Hirsch 2003-09-05 The aesthetically pleasing molecular architectures of fullerenes and nanotubes are appealing not only because of their beauty but also because they are responsible for the many unprecedented chemical and physical properties of this compound class. Although succession of exciting new discoveries continues unabated fullerene research has become a mature science. It is now possible to predict fullerene chemistry, to design new structure variations like

open fullerene clusters, heterofullerenes and endohedral fullerenes, and to develop fullerene materials and modified nanotubes with high potential for technological applications. This volume represents the state-of-the-art of fullerene research, focussing on areas showing high potential for future growth and practical applications. The authors are leading scientists whose groups are making major contributions in the field.

Handbook of Refractory Carbides & Nitrides-Hugh

O. Pierson 1996-12-31
Refractory carbides and nitrides are useful materials with numerous industrial applications and a promising future, in addition to being materials of great interest to the scientific community. Although most of their applications are recent, the refractory carbides and nitrides have been known for over one hundred years. The industrial importance of the refractory carbides and nitrides is growing rapidly, not only in the traditional and well-established applications

based on the strength and refractory nature of these materials such as cutting tools and abrasives, but also in new and promising fields such as electronics and optoelectronics.

Chemistry & Physics of Carbon-Ljubisa R. Radovic
2003-04-11 The Chemistry and Physics of Carbon series presents advances in carbon research and development and comprehensive reviews on the state of the science in all these areas. Building on the tradition of its highly acclaimed predecessors, Volume 28 of this series presents authoritative, interdisciplinary coverage of contemporary topics. With contributions by leading international experts and more than 1300 references, this indispensable volume discusses the structure of glassy carbon, carbon fibers, carbon black (soot), chars, spherulitic graphite in cast iron and naturally occurring forms of carbon; and structural similarities with fullerenes, carbon nanotubes, and carbon nanoparticles.

Optical and Electronic Properties of Fullerenes and Fullerene-Based Materials

Joseph Shinar
1999-11-24 This text covers a host of fullerene applications, including nanotubes, compounds of fullerenes with other elements and structures and polymerized fullerenes. It discusses properties of photoexcited states of fullerenes, neutral and charged states, nonlinear optical response (NLO) and electron-electron interactions.

Fullerenes and Other Carbon-Rich Nanostructures

Jean-François Nierengarten
2014-05-16 **Yanfei Shen and Takashi Nakanishi** Exotic Self-Organized Fullerene Materials Based on Uncommon Hydrophobic-Amphiphilic Approach **Yuming Zhao and Guang Chen** C60 Fullerene Amphiphiles as Supramolecular Building Blocks for Organized and Well-Defined Nano scale Objects **Anna Troeger, Vito Sgobba and Dirk M. Guldi**

Multilayer Assembly for Solar Energy Conversion **Delphine Felder-Flesch** Self- or Induced Organization of [60]Fullerene Hexakisadducts **Andrés de la Escosura, Olga Trukhina, and Tomás Torres** Dual Role of Phthalocyanines in Carbon Nano structure-Based Organic Photovoltaics **Riccardo Marega, Davide Giust and Davide Bonifazi** Supramolecular Chemistry of Carbon Nano tubes at Interfaces: Toward Applications **Stephanie Frankenberger, Johanna A. Januszewski and Rik R. Tykwinski** Oligomers from sp-Hybridized Carbon: Cumulenes and Polyyenes.

Endohedral

Metallofullerenes-**Xing Lu**
2014-12-10 Knowledge on endohedral metallofullerenes (EMFs) has increased dramatically during the last decade. Numerous research findings have been reported, making it an opportune time to provide a systematic update on EMFs. **Endohedral Metallofullerenes: Basics and Applications** presents the most comprehensive review on all aspects of EMFs

including their generation, extraction and isolation, structural issues, theories, intrinsic properties, chemical behaviors, and potential applications. In this book, the editors have collected an impressive amount of information regarding this family of a truly sui generis form of matter. The book's authors were chosen for their specific expertise in EMF research and have been gathered from top research groups from around the world. Graduate students, newcomers to the field, and experienced researchers alike will find this book a highly useful reference on the topic.

Carbon Nanotubes and

Graphene-Kazuyoshi Tanaka

2014-07-10 Carbon Nanotubes and Graphene is a timely second edition of the original Science and Technology of Carbon Nanotubes. Updated to include expanded coverage of the preparation, purification, structural characterization, and common application areas of single- and multi-walled CNT structures, this work compares, contrasts, and,

where appropriate, unitizes CNT to graphene. This much expanded second edition reference supports knowledge discovery, production of impactful carbon research, encourages transition between research fields, and aids the formation of emergent applications. New chapters encompass recent developments in the theoretical treatments of electronic and vibrational structures, and magnetic, optical, and electrical solid-state properties, providing a vital base to research. Current and potential applications of both materials, including the prospect for large-scale synthesis of graphene, biological structures, and flexible electronics, are also critically discussed. Updated discussion of properties, structure, and morphology of biological and flexible electronic applications aids fundamental knowledge discovery Innovative parallel focus on nanotubes and graphene enables you to learn from the successes and failures of, respectively, mature and emergent partner research disciplines High-quality figures and tables on

physical and mathematical applications expertly summarize key information – essential if you need quick, critically relevant data

Carbon Nanotubes and Related Structures-Peter J. F. Harris 2001-10-18 This is a 1999 book on carbon nanotubes, one of the most exciting areas in materials chemistry.

Carbon Molecules and Materials-Ralph Setton 2002-04-11 The unexpected recent discovery and synthesis of a new form of elemental carbon has initiated an abundance of papers on all aspects of the chemistry and physics of the carbon family. Carbon Molecules and Materials takes stock of the current understanding of these various solid forms and, more particularly, of the diamond, graphite and fullerenes. After a historical background on the main properties of the element and on the latest discoveries in the field of fullerene, the

chapters review the chemical and physical aspects of the allotropic forms. It describes the various properties such as thermodynamic, chemical, structural, electronic, electrical, optical and magnetic, and discusses current and potential applications. Written by scientists active in physical and chemical research on the various forms of carbon and closely related fields, the book presents a wealth of information on data and results for students and researchers interested in materials science and in the applications of advanced materials.

Carbon Nanotube Science-Peter John Frederick Harris 2009-03-19 Provides coverage of all of the important aspects of carbon nanotube research, including synthesis, properties and potential applications.