Synthesis Characterization Thermal Decomposition And

Crystal Chemistry of Zinc, Cadmium and Mercury
Preparation, Characterization and Applications
Synthesis of Silicon-Nitrogen-Phosphorus Compounds Including a New Synthesis of Phosphazenes
Synthesis, Characterization and Thermal Decomposition of Hybrid and Reverse Fluorosilicones
Properties and Applications
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Co-crystals
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Polyimides and Other High Temperature Polymers: Synthesis, Characterization and Applications, volume 2
Polyimides and Other High Temperature Polymers: Synthesis, Characterization and Applications
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Synthesis, Characterization, and Thermal Decomposition of [Cl2GAP(SIME3)2]2, A Potential Precursor to Gallium Phosphide
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Ferrite
Issues in Nanotechnology and Micotechnology: Materials and Molecular Research: 2011 Edition

LOGAN HERRING

Crystal Chemistry of Zinc, Cadmium and Mercury
CRC Press
Serving as the only systematic and comprehensive treatment on the topic of nanoparticle-based materials, this book covers synthesis, characterization,

assembly, shaping and sintering of all types of nanoparticles including metals, ceramics, and semiconductors. A single-authored work, it is suitable as a graduate-level text in nanomaterials courses. *Preparation, Characterization and Applications* Elsevier Compostable Polymer Materials deals with an environmentally important family of polymers designed to be disposed of in industrial and municipal compost facilities after their useful life. These compostable plastics undergo degradation and leave no visible, distinguishable or toxic residue. Environmental concerns and legislative measures taken in different regions of the world make composting an increasingly attractive route for the disposal of redundant polymers. This book provides up–to-date results and information about compostable polymer materials in a coherent and comprehensive manner. It covers the entire spectrum of preparation, properties, degradation, and environmental issues. The emphasis is on recent studies concerning compostability and ecotoxicological assessment of polymer materials-–important issues from the ecological point of view. Moreover, the thermal behavior of compostable polymers is described. Their price evolution over the past decade, an estimation of the market and future perspectives are presented. Focus on the composting process,

compostability standards, compost quality and composting studies Coherent and uniformly presented information about methods of preparation; properties, processing and applications Up-to-date information on ecotoxicity testing and studies of polymers Overview of thermal stability and thermal degradation process of compostable polymer materials Presents future perspectives of compostable polymers, including evolution of price during last decade Information about waste management evolution in Europe, USA and Asia (China) with emphasis on composting during the last decade

Synthesis of Silicon-Nitrogen-Phosphorus Compounds Including a New Synthesis of Phosphazenes Elsevier

Synthesis, Characterization, and Thermal Decomposition of Single Source Precursors to Nanocrystalline Binary and Ternary 13-15 MaterialsThe Synthesis, Characterization, and Thermal Decomposition of Some Polymeric Schiff BasesSynthesis, Characterization and Thermal Decomposition of Hybrid and Reverse Fluorosilicones

Synthesis, Characterization and Thermal Decomposition of Hybrid and Reverse Fluorosilicones CRC Press

Well aligned wall carbon nanotubes (MWCNTs), carbon nanofibers (CNFs) and other type of carbon nanostructures materials have been synthesized by a fabricated floating catalyst chemical vapor

deposition (FC-CVD) method. This involved the pyrolysis of benzen-ferrocene vapor mixture. The CVD parameters (Hydrogen flow rate, reaction time and reaction temperature) were studied to selectively synthesize nanotubes and nanofibers with required dimensions. Carbon nanotubes films with a diameter of 2-50 nm and nanofiber with a diameter range from 100-300 nm were synthesized in a benzene/hydrogen atmosphere. Furthermore vapor grown carbon fibers have been synthesized with different diameters and lengths. Iron clusters that were produced from the thermal decomposition of ferrocene films were used as caralyst for the synthesis of the carbon structures. The effects of different hydrogen flow rates (50-500 ml/min) on the morphology, quality and quantity of the product were investigated. Maximum yield and purity was obtained at 300 ml/min. The effect of the reaction time on the purity and yield of carbon nanotubes was studied from 1 minutes to 60 minutes. There was no effect of the reaction time on the average diameter while maximum yield of carbon nanotubes was achieved at 45 minutes. The last variables was the reaction temperature, which was varied from 500 oC to 1200 oC. By controlling the growth temperature, carbon nanotubes (CNTs), carbon nanofibers (CNFs) and vapor grown carbon fiber with different structures were produced. Increasing the

temperature has a remarkable effect on the size and shape of the catalyst and this in turn affected the diameter distribution and structure of the carbon materials. The carbon nanotubes were produced from 600 oC to 850 oC with maximum yield at 850 oC, while for the production of carbon nanofibers the reaction temperature was from 900 oC to 1000 oC with a maximum yield at 1000 oC. Vapor grown carbon fibers were produced at 1050 oC to 1200 oC with maximum yield at 1050 oC. The synthesized nanotubes/nanofibers were invertigated by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The thermal degradation kinetics of CNTs was investigated by dynamic thermogravity, in an air atmosphere, over the temperature range 25-800 oC and at constant nominal heating rate 10 oC/min. The correcponding activation energies, frequency factors and reaction orders were determined. Homogenous distribution of MWCNTs/CNFs in natural rubber (NR) was achieved by ultraconic assisted solution-evaporating method. Addition of 1-10 wt% of CNFs and CNTs to natural rubber as nanocomposite increased the rubber mechanical properties significantly. The properties of the composites such as tensile strength, tensile modulus, and elongation at break were studied. In addition to mechanical testing, the dispersion

state of the MWNTs into NR was studied by TEM in order to understand the morphology of the resulting system. The result indicate that, by increasing the amount of CNTs and CNFs into natural rubber the ductility decreased and the material become stronger and tougher but at the same time more brittle. The results showed that by adding 1 wt% of CNTs and CNFs to NR the stress level increased sharply to 0.56413 to 0.54 Mpa respectively compared to NR which was 0.2839 MPa. At 10 wt% the stress level of CNTs with NR were increased sharply 9 times and reached to 2.55 MPa while for CNFs it increased 4.66 times and reached to 1.33 MPa.

Properties and Applications John Wiley & Sons

Renewable Materials and Green Technology Products: Environmental and Safety Aspects looks at the design, manufacture, and use of efficient, effective, safe, and more environmentally benign chemical products and processes. It includes a broad range of application-based solutions to the development of renewable materials and green technology. The latest trends in the green synthesis and properties of CNs are presented in the first chapter of this book for generating social awareness about sustainable developments. The book goes on to highlight the naissance and progressive trail of microwave-assisted synthesis of metal oxide nanoparticles,

for a clean and green technology tool. Chapters discuss green technological alternatives for the global abatement of air pollution, effective use and treatment of water and wastewater, renewable power generation from solar PV cells, carbon-based nanomaterials synthesized using green protocol for sustainable development, green technologies that help to achieve economic development without harming the environment, technical solutions to cut down the quantum of N losses, conventional processing techniques in developing the bionanocomposites as the biocatalyst, and more. Polymer and Ceramic Composite Materials MDPI Ferrites are highly interesting high-tech materials. The book covers their classification, structure, synthesis, properties and applications. Emphasis is placed on biomedical applications, degradation of organic pollutants, high frequency applications, photocatalytic applications for wastewater remediation, solar cell applications, removal of organic dyes and drugs from aquatic systems, and the synthesis of hexagonal ferrites. Keywords: Ferrite, Spinel Ferrite Nanoparticles, Biomedical Applications, Ferrite Based Heterojunction, Photocatalytic Degradation of Organic Pollutants, Nickel-Zinc Ferrites, Spinel Ferrite Based Nanomaterials, Water Remediation, Magnetic Nano Particles, Wastewater Treatment,

Piezo-Phototronic Effect, Ferrite Based Solar Cells, Aurivillius Based Ceramics, Hexagonal Ferrites.
Mass Spectrometry of Polymers – New Techniques John Wiley & Sons
Traditional fluorosilicones contain a siloxane backbone and pendant fluorinated group leading to low temperature ductility and excellent thermal stability. However, acidic or basic catalysts can reduce the thermal stability from a potential 350°C to 150°C. The predominant decomposition mechanism is through chain scission and it is hypothesized that preventing this will result in polymers with higher thermal stability. Three approaches were taken to prevent chain scission.Second, reverse fluorosilicone (fluorinated backbone and pendant siloxane) terpolymers of chlorotrifluoroethylene (CTFE), vinyl acetate (VAc) and methacryloxypropyl-terminated polydimethylsiloxane (PDMSMA) were synthesized in supercritical CO2 (scCO2) or by emulsion polymerization. Chain scission was prevented as initial decomposition occurred between 231 and 278°C. In both the emulsion and scCO2 cases, VAc was essential in facilitating cross-propagation between CTFE and PDMSMA and the branching was similar suggesting polymerization media does not affect polymer structure. Emulsion-based polymers had higher molar masses

and thermal stability whereas comparable scCO2 polymers had higher yields and incorporated more PDMSMA.Third, a series of homo-, co-, and terpolymers of CTFE, VAc and methacryloxypropyl-terminated silsesquioxane (POSSMA) were synthesized representing the first synthesis of POSSMA containing polymers in scCO2 and demonstrating reverse fluorosilicones can be synthesized without VAc. Chain scission was prevented as initial decomposition occurred from 244 to 296°C with thermal stability increasing with CTFE content to a limit. Decomposition of the polymers was examined and mechanism elucidated. In air, the copolymers give 40 to 47 wt% char since the silsesquioxane oxidizes to SiO2 while in N 2, no residue is seen. In contrast, the terpolymers give a carbonaceous residue of approximately 20 wt% in N2. The flammability and surface properties of the polymers were examined with the terpolymers having flammability similar to p(CTFE) and surface properties comparable to p(POSSMA) giving a low-flammability, hydrophobic polymer.First, a series of hybrid fluorosilicones based on (trifluorovinyl)benzene were synthesized through condensation polymerization with initial decomposition temperatures of approximately 240°C. These were compared to similar aromatic polyethers and removal of

the ether oxygen lowered the initial decomposition temperature by approximately 190°C demonstrating the importance of this oxygen to the stability of polyethers.
CRC Press
The combustion properties of organic materials are used to assess their safety specifications. This knowledge is necessary to avoid potentially disastrous fires. The experimental determination of the combustion properties of a new organic compound is laborious and sometimes even impossible. This book describes methods for the determination and prediction of the combustion properties of organic compounds, along with some examples and exercises.
Functionalized Nanomaterials II
ScholarlyEditions
Nanocomposites are attractive to researchers both from practical and theoretical point of view because of combination of special properties. Many efforts have been made in the last two decades using novel nanotechnology and nanoscience knowledge in order to get nanomaterials with determined functionality. This book focuses on polymer nanocomposites and their possible divergent applications. There has been enormous interest in the commercialization of nanocomposites for a variety of applications, and a number of these applications can already be found in industry. This

book comprehensively deals with the divergent applications of nanocomposites comprising of 22 chapters.

Applications of Nanocomposite Materials in Drug Delivery CRC Press

This Special Issue deals with crystal–chemical aspects of the zinc triad elements, thereby spanning a broad range from alloys, metal–organic compounds, and ionic compounds, through to molecular species.

Methods for Prediction of their Performance CRC Press

Sodium silicide NaSi, or better written as Na4Si4 to reflect the crystal structure of the compound, is a typical Zintl phase, which has been found an excellent precursor to nanostructured Si materials as well as Si clathrate compounds. This dissertation research investigates the synthesis and characterization of the intentional n-type impurity doping of Na4Si4 with P, and uses the successfully P-doped Na4Si4 as a precursor to prepare P-doped amorphous and nanocrystalline Si materials as well as P-doped Si clathrate structures. The semiconducting products of these reactions could be good candidates for energy applications such as thin film microelectronics or optoelectronics. Chapter One of this dissertation provides a general introduction to Zintl phases and sodium silicide. Chapter Two presents the synthesis

and characterization of the n-type doped Zintl phase, $Na4Si4_{\underline{x}}Px$ (x = 0.04, 0.08, 0.12) via the direct elemental reaction with the traditional ampoule technique. Powder XRD, EDX, FT-Raman and 23Na, 29Si and 31P solid state MAS NMR provide consistent evidence of the substitution of Si sites with P in the Na4Si4 lattice. The as-prepared P-doped Na4Si4 with nominal P concentration of 1 at.% is used as the precursor to prepare P-doped amorphous and nanocrystalline Si via a solid state metathesis reaction route with NH4 I, with the surface partially terminated by H and O. The synthesis and characterization of the products with powder XRD, HRTEM, FTIR, EPMA, 29Si and 31P solid state MAS NMR are presented in Chapter Three. The results show that P is doped into the Si structure with the concentration of approximately 0.07 at.%. Chapter Four continues to explore the synthesis of P-doped Si clathrate compounds by the thermal decomposition of the nominally 1 at.% P-doped Na4Si4. Powder XRD data show the product is a mixture of type I and type II Si clathrates, NaSi46 and $Na_{\underline{x}}Si136$, respectively, which is then separated by simple sink-float method. EPMA-WDS confirms the presence of P in the thermal decomposition product, while 23Na, 29Si and 31P soild state MAS NMR results indicate that a small amount of P is doped into Si framework

with the concentration of about 0.5 at.% The dissertation research also explored other dopants for the Zintl phase Na4Si4; herein presented in Chapter Five is carbon. The initial results suggest possible success of up to 40 at.% of C loading level based on powder XRD data and subsequent cell refinement, while by 50 at.% the reaction surprisingly and interestingly resulted in a mixture of NbSi2, presumably from the reaction of Nb tube and Si, type II Si clathrate NaxSi136 and unreacted C, as revealed by EDX and HRTEM. Included in Appendix A is the Raman, HRTEM and EELS studies done on the mechanically alloyed system of ammonia borane and hexagonal boron nitride, in assistance with others' project, and Appendix B, the preparation and TEM of the interesting Au nanoprisms.

Handbook of Fire Resistant Textiles CRC Press

Multi-component crystalline systems or co-crystals have received tremendous attention from academia and industry alike in the past decade. Applications of co-crystals are varied and are likely to positively impact a wide range of industries dealing with molecular solids. Co-crystallization has been used to improve the properties and performance of materials from pharmaceuticals to energetic materials, as well as for separation of compounds. This book combines co-crystal applications of commercial and practical

interest from diverse fields in to a single volume. It also examines effective structural design of co-crystals, and provides insights into practical synthesis and characterization techniques. Providing a useful resource for postgraduate students new to applied co-crystal research and crystal engineering, it will also be of interest to established researchers in academia or industry.

Synthesis, Characterization, and Thermal Decomposition of Single Source Precursors to Nanocrystalline Binary and Ternary 13-15 Materials John Wiley & Sons

This volume explains the theory and experimental investigations in the preparation of heterophase polymer network materials through cure reaction-induced microphase separation (CRIMPS). It describes the synthesis of a new family of block- and graft-copolymers with controlled solubility in epoxies and characterizes CRIMPS processes using novel applications of known methods such as nuclear magnetic resonance, electron spin resonance and photochemistry. The text develops a new method for characterizing the molecular mass distribution (MMD) of linear and network polymers using thermomechanical analysis data, as well as new methods for determining internal stresses and flaw formation during thermoset curing. The

CRIMPS theory will be helpful for researchers and engineers designing and improving toughened plastics and other smart heterophase network materials for different applications. The new method for MMD characterization of polymers in bulk will be very useful to quickly analyze a polymer's MMD and to design new polymers. This book will provide a useful reference for graduates, researchers and working professionals in polymer chemistry and physics and materials science.

Co-crystals BoD – Books on Demand

This volume chronicles the proceedings of the Third International Symposium on Polyimides and Other High Temperature Polymers: Synthesis, Characterization, and Applications, held in Orlando, December 17-19, 2003. This volume is divided into three parts. Part 1. “Synthesis, Properties and Bulk Characterization”; Part 2 “Hybrids and Composites” and Part 3 “Applications and General Papers”. The topics covered include: Synthesis, characterization and processing (including some novel approaches) of a variety of polyimides and other high temperature polymers; structure-property relationships; hybrids and nanocomposites using these materials and their characterization, properties and applications; segmental dynamics in polyimide materials; photoalignable polyimides; photoconductivity and

photosensitivity of polyimides; ultrafiltration membranes from polyetherimide; polyimide as a tunneling barrier; polymer materials for nonlinear optical applications; alignment of SWNTs in rigid-rod polymer compositions; surface modification of polyimide; adhesion of Cu to polyimide surfaces; and polyimide erosion in a low Earth orbit space environment.

Synthesis, Characterization and Application of Carbon Nanotubes and Carbon Nanofibers CRC Press

Cl2GaP(SiMe3)22 (1) has been prepared form the 1:1 reaction of GaCl3 with P(SiMe3)3. Thermal decomposition of 1 produces a brown powder which contains GaP, as evidenced by an X-ray powder pattern and partial elemental analysis. Compound 1 crystallizes in the monoclinic space group P21/n (14) with a - 9.754(2), b = 15.585(5), c = 9.839(2) angstrom, and Beta = 96.18(1) deg, is composed of a planar Ga-P-GA-P ring, with Ga-P bond distances of 2.378(2) and 2. 380(2) Angstrom, and contains exocyclic chlorine and SiMe3 ligands. The ring core is a slightly distorted square, with Ga-P-Ga' and P-Ga-P' bond angles of 86.41(7) and 93.59(7) deg, respectively. Additionally, H NMR confirms that 1 exhibits monomer-dimer equilibrium in solution.

Polyimides and Other High Temperature Polymers: Synthesis, Characterization and Applications, volume 2 Walter de Gruyter GmbH & Co KG

Issues in Nanotechnology and Micotechnology: Materials and Molecular Research: 2011 Edition is a ScholarlyBrief™ that delivers timely, authoritative, comprehensive, and specialized information about Nanotechnology and Micotechnology—Materials and Molecular Research in a concise format. The editors have built Issues in Nanotechnology and Micotechnology: Materials and Molecular Research: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Nanotechnology and Micotechnology—Materials and Molecular Research in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Nanotechnology and Micotechnology: Materials and Molecular Research: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

Polyimides and Other High Temperature Polymers: Synthesis, Characterization and Applications Elsevier

The functionalization of nanomaterials provides them with some unique properties, making the same nanomaterial amenable for various applications by simply manipulating functional components. However, functionalized nanomaterials also face some challenges, along with some encouraging new applications in the future. This book provides a detailed account of applications of the functionalization of nanomaterials. This book can serve as a reference book for scientific investigators, including doctoral and post-doctoral scholars and undergraduate and graduate students, in context with the scope of applications of functionalized nanomaterials. It also highlights recent advances, challenges, and opportunities in the application of nanomaterials. This book will provide critical and comparative data for nanotechnologists. It may also be beneficial for multidisciplinary researchers, industry personnel, journalists, policy makers, and the common public to understand the scope of functionalized nanomaterials in detail and in depth. Features: This book covers various applications of functionalized nanomaterials. It discusses recent global research trends and future applications of functionalized nanomaterials. It highlights the need for more rigorous regulatory frameworks for the safe

use of functionalized nanomaterials. It contains contributions from international experts and will be a valuable resource for researchers. *Applications* Synthesis, Characterization, and Thermal Decomposition of Single Source Precursors to Nanocrystalline Binary and Ternary 13-15 MaterialsThe Synthesis, Characterization, and Thermal Decomposition of Some Polymeric Schiff BasesSynthesis, Characterization and Thermal Decomposition of Hybrid and Reverse FluorosiliconesPhD.Synthesis, Characterization and Thermal Decomposition of Hybrid and Reverse FluorosiliconesTraditional fluorosilicones contain a siloxane backbone and pendant fluorinated group leading to low temperature ductility and excellent thermal stability. However, acidic or basic catalysts can reduce the thermal stability from a potential 350°C to 150°C. The predominant decomposition mechanism is through chain scission and it is hypothesized that preventing this will result in polymers with higher thermal stability. Three approaches were taken to prevent chain scission.Second, reverse fluorosilicone (fluorinated backbone and pendant siloxane) terpolymers of chlorotrifluoroethylene (CTFE), vinyl acetate (VAc) and methacryloxypropyl-terminated polydimethylsiloxane (PDMSMA) were synthesized in supercritical CO2 (scCO2) or by emulsion

polymerization. Chain scission was prevented as initial decomposition occurred between 231 and 278°C. In both the emulsion and scCO2 cases, VAc was essential in facilitating cross-propagation between CTFE and PDMSMA and the branching was similar suggesting polymerization media does not affect polymer structure. Emulsion-based polymers had higher molar masses and thermal stability whereas comparable scCO2 polymers had higher yields and incorporated more PDMSMA.Third, a series of homo-, co-, and terpolymers of CTFE, VAc and methacryloxypropyl-terminated silsesquioxane (POSSMA) were synthesized representing the first synthesis of POSSMA containing polymers in scCO2 and demonstrating reverse fluorosilicones can be synthesized without VAc. Chain scission was prevented as initial decomposition occurred from 244 to 296°C with thermal stability increasing with CTFE content to a limit. Decomposition of the polymers was examined and mechanism elucidated. In air, the copolymers give 40 to 47 wt% char since the silsesquioxane oxidizes to SiO2 while in N 2, no residue is seen. In contrast, the terpolymers give a carbonaceous residue of approximately 20 wt% in N2. The flammability and surface properties of the polymers were examined with the terpolymers having flammability similar to p(CTFE) and surface

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equilibrium in solution.Synthesis and Characterization of Poly(dibromophenylene Oxide)s Through Thermal Decomposition of Various Transition Metal Complexes in Solid StateCrystal Chemistry of Zinc, Cadmium and Mercury
Fluoropolymers are very unique materials. Since the middle of the twentieth century fluoropolymers have been used in applications where a wide temperature range, a high resistance to aggressive media, excellent tribological characteristics, and specific low adhesion are required. Today, researchers turn to fluoropolymers to solve new challenges and to develop materials with previously unattainable properties. Opportunities for Fluoropolymers: Synthesis, Characterization, Processing, Simulation and Recycling covers recent developments in fluoropolymers, including synthesis of new copolymers, strategies for radical polymerization of fluoromonomers (conventional or controlled; RDRP), and the modification of fluoropolymers to achieve desired material characteristics. This volume in the Progress in Fluorine Science series is ideal for researchers and engineers who want to learn about the synthetic strategies, properties, and recycling of these special polymers, as well as industrial manufacturers who are interested in achieving new product characteristics in their respective industries.

Written by a global team of fluoropolymer experts Includes conventional techniques of radical polymerization and more modern controlled polymerization techniques Covers nanocomposites, which are of interest to researchers and industrial manufacturers of fluoropolymers

Energetic Nanomaterials

Walter de Gruyter GmbH & Co KG

Energetic Nanomaterials: Synthesis, Characterization, and Application provides researchers in academia and industry the most novel and meaningful knowledge on nanoenergetic materials, covering the fundamental chemical aspects from synthesis to application. This valuable resource fills the current gap in book publications on nanoenergetics, the energetic nanomaterials that are applied in explosives, gun and rocket propellants, and pyrotechnic devices, which are expected to yield improved properties, such as a lower vulnerability towards shock initiation, enhanced blast, and environmentally friendly replacements of currently used materials. The current lack of a systematic and easily available book in this field has resulted in an underestimation of the input of nanoenergetic materials to modern technologies. This book is an indispensable resource for researchers in academia, industry, and research institutes dealing with the production and characterization of energetic materials all

over the world. Written by high-level experts in the field of nanoenergetics Covers the hot topic of energetic nanomaterials, including nanometals and their applications in nanoexplosives Fills a gap in energetic nanomaterials book publications

Synthesis, Characterization, Processing, Simulation and Recycling
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