

Reversible Chain Transfer Catalyzed Polymerization Rtcp

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Organophosphorus Compounds—Advances in Research and Application: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Organophosphorus Compounds. The editors have built Organophosphorus Compounds—Advances in Research and Application: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Organophosphorus Compounds 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 Organophosphorus Compounds—Advances in Research and Application: 2012 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/>.

This thesis is organized in three chapters and is based on three published papers, and two manuscripts about to be submitted. Molecularly imprinted polymers (MIPs) are tailor-made synthetic receptors that are obtained by polymerization in the presence of a molecular template. The first paper describes the use of Raman spectroscopy to detect and quantify the presence of the imprinting template in single molecularly imprinted polymer microspheres. The polymers were imprinted with the Beta-blocking drugs propranolol and atenolol, and precipitation polymerization was used to obtain spherical particles. The nanoparticles were used for bulk detection whereas with micrometer-sized particles, quantitative measurements on single particles were possible. Relatively low detection limits down to 1⁻⁷ M have been reached for the detection of S-propranolol through bulk measurements on MIP nanoparticles. The second paper describes chemical nanosensors with a submicron core-shell composite design, based on a polymer core, a molecularly imprinted polymer (MIP) shell for selective analyte recognition, and an interlayer of gold nanoparticles for signal amplification. SERS measurements on single nanosensors yielded a detection limit of 10⁻⁷ M for the Beta-blocker propranolol, several orders of magnitude lower than on plain MIP spheres. These particles were also used as sensor materials with localized surface plasmon resonance measurements as the transduction method (Paper III), for the determination of the Beta-blocking drug propranolol. The sensors were used in suspension and were measured using a standard UV-Vis spectrophotometer. In order to solve general problems associated with MIPs, in particular their heterogeneity in terms of inner morphology and distribution of

binding site affinities, it has been suggested to use modern methods of controlled/living radical polymerization for their synthesis. This also facilitates their generation in the form of nanomaterials, nanocomposites, and thin films, a strong recent trend in the field. The fourth paper reviews recent advances in the molecular imprinting area, with special emphasis on the use of controlled polymerization methods, their benefits, and current limitations. In the last paper, we have for the first time used a recently developed CRP method based on iodide mediated polymerization, reversible chain transfer catalyzed polymerization (RTCP), for the synthesis of MIPs. We show on the example of MIPs specific for the Beta-blocking drug propranolol that RTCP is compatible with MIP synthesis, both for the synthesis of bulk polymers and nanospheres, and that it yields polymers with the same binding capacity as the standard FRP method used for comparison. Solid-state NMR measurements revealed that the conversion of pendant vinyl groups was higher with RTCP than with polymers synthesized by FRP, in particular at higher initiator concentrations.

Controlled/living radical polymerization (CRP) has revolutionized and revitalized the field of synthetic polymer chemistry over the last twenty years as it is now possible to prepare a wide variety of previously inaccessible macromolecules under relatively mild conditions.

Fundamentals of Controlled/Living Radical Polymerization provides an in-depth coverage of the essential chemical principles that enable and govern each of the CRP methods. The book starts with a brief historical overview of the major findings in polymer science which eventually led to the development of living ionic and living radical systems. It then goes on to introduce the main CRP techniques including their mechanistic understanding. The book also provides the information needed to select the appropriate reagents and conditions to conduct various CRP methods in a practical setting. Therefore, in addition to a newcomer gaining an appreciation for what has already been accomplished, the reader will be armed with the tools needed to begin independent research. Fundamentals of Controlled/Living Radical Polymerization provides essential insight into a rapidly growing field that goes beyond a simple literature review of the area. Written by leading experts in the field, the book is an indispensable resource for all researchers, instructors, and students in polymer chemistry.

The book provides an up-to-date overview of the diverse medical applications of advanced polymers. The book opens by presenting important background information on polymer chemistry and physicochemical characterization of polymers. This serves as essential scientific support for the subsequent chapters, each of which is devoted to the applications of polymers in a particular medical specialty. The coverage is broad, encompassing orthopedics, ophthalmology, tissue engineering, surgery, dentistry, oncology, drug delivery, nephrology, wound dressing and healing, and cardiology. The development of polymers that enhance the biocompatibility of blood-contacting medical devices and the incorporation of polymers within biosensors are also addressed. This book is an excellent guide to the recent advances in polymeric biomaterials and bridges the gap between the research literature and standard textbooks on the applications of polymers in medicine.

Polymeric and hybrid nanoparticles have received increased scientific interest in terms of basic research as well as commercial applications, promising a variety of uses for nanostructures in fields including bionanotechnology and medicine. Condensing the relevant research into a comprehensive reference, Polymer and Polymer-Hybrid Nanoparticles: From Synthesis to Biomedical Applications covers an array of topics from synthetic procedures and macromolecular design to possible biomedical applications of nanoparticles and materials based on original and unique polymers. The book presents a well-rounded picture of objects ranging from simple polymeric micelles to complex hybrid polymer-based nanostructures, detailing synthetic procedures, techniques for characterization and analysis, properties, and behavior in selective solvents and dispersions. Each chapter contains background and introductory information, summarizing generalities on the nanosystems being discussed. The chapters also describe representative works of experts and provide in-depth, focused discussions. The authors present

current knowledge on the following topics: Designed synthesis of functional polymers Construction of block copolymer micellar and nonmicellar self-assembled structures Construction of organic–organic hybrid nanosized particles Construction of organic–inorganic hybrid nanoparticles and nanoassemblies The final chapter addresses biological applications of polymeric nanoparticles, including delivery of low-molecular-weight drugs, macromolecular drugs, imaging and diagnostics, and photodynamic therapy. Summarizing important developments in the field, the authors condense relevant research into a comprehensive resource.

This book comprehensively covers researches on enzymatic polymerization and related enzymatic approaches to produce well-defined polymers, which is valuable and promising for conducting green polymer chemistry. It consists of twelve chapters, including the following topics: The three classes of enzymes, oxidoreductases, transferases and hydrolases, have been employed as catalysts for enzymatic polymerization and modification; Well-defined polysaccharides are produced by enzymatic polymerization catalyzed by hydrolases and transferases; Hydrolase-catalyzed polycondensation and ring-opening polymerization are disclosed to produce a variety of polyesters; Polyesters are synthesized by in-vivo acyltransferase catalysis produced by microorganisms; Enzymatic polymerization catalyzed by appropriate enzymes also produces polypeptides and other polymers; Poly(aromatic)s are obtained by enzymatic polymerization catalyzed by oxidoreductases and their model complexes; Such enzymes also induce oxidative polymerization of vinyl monomers; Enzymatic modification of polymers is achieved to produce functionalized polymeric materials; The enzymatic polymerization is a green process with non-toxic catalysts, high catalyst efficiency, green solvents and renewable starting materials, and minimal by-products; Moreover, renewable resources like biomass are potentially employed as a starting substrate, producing useful polymeric materials. This book is not only educative to young polymer chemists like graduate students but also suggestive to industrial researchers, showing the importance of the future direction of polymer synthesis for maintaining a sustainable society.

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This book commences with a general introduction outlining the basic concepts of radical polymerization. This is followed by a chapter on radical reactions that is intended to lay the theoretical ground-work for the succeeding chapters on initiation, propagation and termination.

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Synthesis of Polymers New Structures and Methods John Wiley & Sons

Magnetic Nanoparticle-Based Hybrid Materials: Fundamentals and Applications introduces the principles, properties, and emerging applications of this important materials system. The hybridization of magnetic nanoparticles with metals, metal oxides and semiconducting nanoparticles may result in superior properties. The book reviews the most relevant hybrid materials, their mechanisms and properties. Then, the book focuses on the rational design, controlled synthesis, advanced characterizations and in-depth understanding of structure-property relationships. The last part addresses the promising applications of hybrid nanomaterials in the real world such as in the environment, energy, medicine fields. Magnetic Nanoparticle-Based Hybrid Materials: Fundamentals and Applications comprehensively reviews both the theoretical and experimental approaches used to rapidly advance nanomaterials that could result in new technologies that impact day-to-day life and society in key areas such as health and the environment. It is suitable for researchers and practitioners who are materials scientists and engineers, chemists or physicists in academia and R&D. Provides in-depth information on the basic principles of magnetic nanoparticles-based hybrid materials such as synthesis, characterization, properties, and magnon interactions Discusses the most relevant hybrid materials systems including integration of metals, metal oxides, polymers, carbon and more Addresses the emerging applications in medicine, the environment, energy, sensing, and computing enabled by magnetic nanoparticles-based hybrid materials

Green Sustainable Processes for Chemical and Environmental Engineering and Science: Supercritical Carbon Dioxide as Green Solvent provides an in-depth review on the area of green processes for the industry, focusing on the separation, purification and extraction of medicinal, biological and bioactive compounds utilizing supercritical carbon dioxide as a green solvent and their applications in pharmaceuticals, polymers, leather, paper, water filtration, textiles and more. Chapters explore polymerization, polymer composite production, polymer blending, particle production, microcellular foaming, polymer processing using supercritical carbon dioxide, and a method for the production of micro- and nano-scale particles using supercritical carbon dioxide that focuses on the pharmaceutical industry. A brief introduction and limitations to the practical use of supercritical carbon dioxide as a reaction medium are also discussed, as are the applications of supercritical carbon dioxide in the semiconductor processing industry for wafer processing and its advantages and obstacles. Reviews available green solvents for extraction, separation, purification and synthesis Outlines environmentally friendly chemical processes in many applications, i.e., organic reactions, metal recovery, etc. Includes numerous, real industrial applications, such as polymers, pharmaceuticals, leather, paper, water filtration, textiles, food, oils and fats, and more Gives detailed accounts of the application of supercritical CO₂ in polymer production and processing Provides a process for extraction, separation and purification of compounds of biological medicinal importance Gives methods for nanoparticle production using supercritical carbon dioxide Provides a systematic discussion on the solubility of organic and organometallic compounds

A contemporary compilation of recent achievements in organometallic chemistry The prestigious International Conference on Organometallic Chemistry (ICOMC) was launched in 1963, providing a forum for researchers from around the world to share their findings and explore new paths to advance our knowledge and application of organometallic chemistry. The 25th ICOMC, held in Lisbon in 2012, gathered more than 1,200 participants from 54 countries. This volume celebrates the 25th Silver Edition and the 50th Gold Year of the ICOMC. Featuring contributions from invited 25th ICOMC speakers, Advances in Organometallic Chemistry and Catalysis highlights recent

achievements and new and emerging areas of research in the field. Its seven sections cover: Activation and Functionalization of Carbon Single Bonds and Small Molecules Organometallic Synthesis and Catalysis Organometallic Polymerization Catalysis Organometallic Polymers and Materials Organometallic Chemistry and Sustainable Energy Bioorganometallic Chemistry Organometallic Electrochemistry Chapters discuss fundamental underlying concepts, offer illustrative examples and cases, and explore future avenues for continued research. Readers will discover basic principles and properties of organometallic compounds, reaction mechanisms, and detailed descriptions of current applications. Collectively, these chapters underscore the versatility, richness, and potential of modern organometallic chemistry, including its interrelationships with other scientific disciplines. All the contributions are extensively referenced, providing a gateway to the most important original research papers and reviews in organometallic chemistry. Presenting a contemporary understanding of organometallic chemistry and its many applications, *Advances in Organometallic Chemistry and Catalysis* is recommended for all researchers in the field, from students to advanced investigators.

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The series *Topics in Organometallic Chemistry* presents critical overviews of research results in organometallic chemistry. As our understanding of organometallic structure, properties and mechanisms increases, new ways are opened for the design of organometallic compounds and reactions tailored to the needs of such diverse areas as organic synthesis, medical research, biology and materials science. Thus the scope of coverage includes a broad range of topics in pure and applied organometallic chemistry, where new breakthroughs are being achieved that are of significance to a larger scientific audience. The individual volumes of *Topics in Organometallic Chemistry* are thematic. Review articles are generally invited by the volume editors.

The proposed book focusses on metal mediated/catalyzed “controlled/living radical polymerization” (CRP/LRP) methods. It surveys a wide variety of catalyzed polymerization reactions, making it essentially a “one stop” review in the field. A significant contribution to polymer science is “metathesis polymerization” discovered by Grubbs and others. The book will cover various metathesis polymerization methods and implications in polymer industry.

Including recent advances and historically important catalysts, this book overviews methods for developing and applying polymerization catalysts – dealing with polymerization catalysts that afford commercially acceptable high yields of polymer with respect to catalyst mass or productivity. • Contains the valuable data needed to reproduce syntheses or use the catalyst for new applications • Offers a guide to the design and synthesis of catalysts, and their applications in synthesis of polymers • Includes the information essential for choosing the appropriate reactions to maximize yield of polymer synthesized • Presents new chapters on

vanadium catalysts, Ziegler catalysts, laboratory homopolymerization, and copolymerization

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

Presents new developments in controlled/living radical polymerization in three areas: atom transfer radical polymerization (ATRP), nitroxide mediated polymerization (NMP), and reversible addition-fragmentation transfer (RAFT). Also includes synthesis and characterization of many new materials.

The completely revised third edition of this four-volume classic is fully updated and now includes such topics as CH-activation and multicomponent reactions. It describes the most important reaction types, new methods and recent developments in catalysis. The internationally renowned editors and a plethora of international authors (including Nobel laureate R. Noyori) guarantee high quality content throughout the book. A "must read" for everyone in academia and industry working in this field.

Highlighting dynamic developments in polymer synthesis, this book focuses on the chemical techniques to synthesize and characterize biomedically relevant polymers and macromolecules. • Aids researchers developing polymers and materials for biomedical applications • Describes biopolymers from a synthetic perspective, which other similar books do not do • Covers areas that include: cationically-charged macromolecules, pseudo-peptides, polydrugs and prodrugs, controlled radical polymerization, self-assembly, polycondensates, and polymers for surface modification

The series Advances in Polymer Science presents critical reviews of the present and future trends in polymer and biopolymer science. It covers all areas of research in polymer and biopolymer science including chemistry, physical chemistry, physics, material science. The thematic volumes are addressed to scientists, whether at universities or in industry, who wish to keep abreast of the important advances in the covered topics. Advances in Polymer Science enjoys a longstanding tradition and good reputation in its community. Each volume is dedicated to a current topic, and each review critically surveys one aspect of that topic, to place it within the context of the volume. The volumes typically summarize the significant developments of the last 5 to 10 years and discuss them critically, presenting selected examples, explaining and illustrating the important principles, and bringing

together many important references of primary literature. On that basis, future research directions in the area can be discussed. *Advances in Polymer Science* volumes thus are important references for every polymer scientist, as well as for other scientists interested in polymer science - as an introduction to a neighboring field, or as a compilation of detailed information for the specialist. Review articles for the individual volumes are invited by the volume editors. Single contributions can be specially commissioned. Readership: Polymer scientists, or scientists in related fields interested in polymer and biopolymer science, at universities or in industry, graduate students

This book is focused on recent progress in the dynamically developing field of controlled/living radical polymerization. It is a sequel to ACS Symposium Series 685, 768, 854, and 944. Volume 1023 contains 26 chapters on mechanistic, synthetic and materials aspects of ATRP. Volume 1024 contains 24 chapters on other controlled/living radical polymerization techniques.

Polyolefin is a major industry that is important for our economy and impacts every aspect of our lives. The discovery of new transition metal-based catalysts is one of the driving forces for the further advancement of this field. Whereas the classical heterogeneous Ziegler-Natta catalysts and homogeneous early transition metal metallocene catalysts remain the workhorses of the polyolefin industry, in roughly the last decade, tremendous progress has been made in developing non-metallocene-based olefin polymerization catalysts. Particularly, the discovery of late transition metal-based olefin polymerization catalysts heralds a new era for this field. These late transition metal complexes not only exhibit high activities rivaling their early metal counterparts, but more importantly they offer unique properties for polymer architectural control and copolymerization with polar olefins. In this book, the most recent major breakthroughs in the development of new olefin polymerization catalysts, including early metal metallocene and non-metallocene complexes and late transition metal complexes, are discussed by leading experts. The authors highlight the most important discoveries in catalysts and their applications in designing new polyolefin-based functional materials.

This book describes strategies and mechanism of reversible deactivation radical polymerization (RDRP) to synthesize functional polymers. Several approaches such as atom transfer radical polymerization and the combination of click chemistry and RDRP are summarized. Contributors from interdisciplinary fields highlight applications in nanotechnology, self-healing materials, oil and water resistant coatings and controlled drug delivery systems.

Designing polymers and developing polymerization processes that are safe, prevent pollution, and are more efficient in the use of materials and energy is an important topic in modern chemistry. Today, green polymer research can be seen increasingly in academia and industry. It tackles all aspects of polymers and polymerization - everything from chemical feedstocks, synthetic pathways, and reaction media to the nature of the final polymer as related to its inherent nontoxicity or degradability. This book summarizes and evaluates the latest developments in green polymerization methods.

Specifically, new catalytic methods and processes which incorporate renewable resources will be discussed by leading experts in the field of polymer chemistry. This book is a must-have for Polymer Chemists, Chemists Working with/on Organometallics, Biochemists, Physical Chemists, Chemical Engineers, Biotechnologists, Materials Scientists, and Catalytic Chemists.

Stable radicals - molecules with odd electrons which are sufficiently long lived to be studied or isolated using conventional techniques - have enjoyed a long history and are of current interest for a broad array of fundamental and applied reasons, for example to study and drive novel chemical reactions, in the development of rechargeable batteries or the study of free radical reactions in the body. In *Stable Radicals: Fundamentals and Applied Aspects of Odd-Electron Compounds* a team of international experts provide a broad-based overview of stable radicals, from the fundamental aspects of specific classes of stable neutral radicals to their wide range of applications including synthesis, materials science and chemical biology. Topics covered include: triphenylmethyl and related radicals polychlorinated triphenylmethyl radicals: towards multifunctional molecular materials phenalenyls, cyclopentadienyls, and other carbon-centered radicals the nitrogen oxides: persistent radicals and van der Waals complex dimers nitroxide radicals: properties, synthesis and applications the only stable organic sigma radicals: di-tert-alkyliminoxyls. delocalized radicals containing the hydrazyl [R₂N-NR] unit metal-coordinated phenoxyl radicals stable radicals containing the thiazyl unit: synthesis, chemical, and materials properties stable radicals of the heavy p-block elements application of stable radicals as mediators in living-radical polymerization nitroxide-catalyzed alcohol oxidations in organic synthesis metal-nitroxide complexes: synthesis and magneto-structural correlations rechargeable batteries using robust but redox-active organic radicals spin labeling: a modern perspective functional in vivo EPR spectroscopy and imaging using nitroxides and trityl radicals biologically relevant chemistry of nitroxides *Stable Free Radicals: Fundamentals and Applied Aspects of Odd-Electron Compounds* is an essential guide to this fascinating area of chemistry for researchers and students working in organic and physical chemistry and materials science.

In recent years polymerisation using organocatalysts has become an appealing alternative to more traditional metal-based catalysts. Conferring numerous advantages including low cost and ease of use, as well as the ability to precisely control the synthesis of advanced polymer structures, organocatalysts are increasingly used in polymer synthesis. *Organic Catalysis for Polymerisation* provides a holistic overview of the field, covering all process in the polymer synthesis pathway that are catalysed by organic catalysts. Sub-divided into two key sections for ease of use, the first focuses on recent developments in catalysis and the applications of catalysts to the full range of polymerisations that they have been utilised in; the second concerning monomers, arranges the field by monomer type and polymerisation

mechanism. The book will therefore, provide a complimentary view of the field, providing both an overview of state-of-the-art catalyst development and also the best methodologies available to create specific polymer types. Edited by leading figures in the field and featuring contributions from researchers across the globe, this title will serve as an excellent reference for postgraduate students and researchers in both academia and industry interested in polymer chemistry, organic chemistry, catalysis and materials science.

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Smart Polymer Catalysts and Tunable Catalysis describes the latest advances in smart polymer catalysts and tunable catalysis. This book will serve as an ideal reference for scientists, students and researchers working in the fields of catalysis, chemical engineering, chemistry, materials science, biotechnology and nanotechnology. Users will find this to be a distinct, systematic and comprehensive body of knowledge on the field with its compilation of essential knowledge and discussions of extensive potential in both social and commercial impacts. Provides a single-source summary of the emerging frontiers in scientific research in smart polymer catalysts and tunable catalysis Includes very well-organized chapters that are illustrated with over 130 illustrations and figures Written by scientists from prestigious universities and industries across the world Edited by veteran researchers in the field of smart polymers and catalysis

There is an increasing need to find cost-effective and environmentally sound methods of converting natural resources into fuels, chemicals and energy; catalysts are pivotal to such processes. Catalysis highlights major developments in this area. Coverage of this Specialist Periodical Report includes all major areas of heterogeneous catalysis. In each volume, specific areas of current interest are reviewed. Examples of topics include experimental methods, acid/base catalysis, materials synthesis, environmental catalysis, and syngas conversion.

Functionalized polymers are macromolecules to which chemically bound functional groups are attached which can be used as catalysts, reagents, protective groups, etc. Functionalized polymers have low cost, ease of processing and attractive features for functional organic

molecules. Chemical reactions for the introduction of functional groups in polymers and the conversion of functional groups in polymers depend on different properties. Such properties are of great importance for functionalization reactions for possible applications of reactive polymers. This book deals with the synthesis and design of various functional polymers, the modification of preformed polymer backbones and their various applications.

Edited by foremost leaders in chemical research together with a number of distinguished international authors, this fourth volume summarizes the most important and promising recent developments in synthesis, polymer chemistry and supramolecular chemistry. Interdisciplinary and application-oriented, this ready reference focuses on innovative methods, covering new developments in catalysis, synthesis, polymers and more. Edited by foremost leaders in chemical research together with a number of distinguished international authors, this fourth volume summarizes the most important and promising recent developments in synthesis, polymer chemistry and supramolecular chemistry. Interdisciplinary and application-oriented, this ready reference focuses on innovative methods, covering new developments in catalysis, synthesis, polymers and more.

Polymer Brushes: Substrates, Technologies, and Properties covers various aspects of polymer brush technology, including synthesis, properties, performance, and applications. It presents both experimental details and theoretical insights to enable a better understanding of the brush system. After an overview of polymer brush systems, the book discusses methods for grafting organic brushes from the surface of clay platelets and for the covalent grafting of PNIPAm brushes. It then describes ferrocene polymer brushes, nonfouling brushes on poly(ethylene terephthalate) film surfaces, brushes formed on the inner surface of cylindrical pores, and the "zipper brush" approach. The authors examine the use of scanning electrochemical microscopy for analyzing brushes and compare surface-controlled atom transfer radical polymerization and surface-controlled single-electron transfer living radical polymerization. They also explore the application of polymer brushes in the chromatographic separations of viruses and proteins and the suppression of proteins and cell adhesions. The text concludes with a look at how polymer brushes are synthesized by surface-initiated iniferter-mediated polymerization. This book provides a one-stop reference on the various substrates and technologies used to synthesize polymer brushes. The hands-on information in the text will help readers choose the proper synthesis methods and materials for their system.

Polymers are huge macromolecules composed of repeating structural units. While polymer in popular usage suggests plastic, the term actually refers to a large class of natural and synthetic materials. Due to the extraordinary range of properties accessible, polymers have come to play an essential and ubiquitous role in everyday life - from plastics and elastomers on the one hand to natural biopolymers such as DNA and proteins on the other hand. The study of polymer science begins with understanding the methods in which these materials are synthesized. Polymer synthesis is a complex procedure and can take place in a variety of ways. This book brings together the "Who is who" of polymer science to give the readers an overview of the large field of polymer synthesis. It is a one-stop reference and a must-have for all Chemists, Polymer Chemists, Chemists in Industry, and Materials Scientists.

Catalysis, the basic principle for overcoming the kinetic inhibition of chemical reactions, is fundamental in chemistry. In particular, organometallic catalysis plays an overwhelming role in both research and industry. It opens the way to entirely novel synthetic methods and finds widespread applications ranging from mass-production of everyday polymers to stereocontrolled synthesis of bioactive chemicals used as pharmaceuticals and agrochemicals. The targeted development of improved and novel catalysts demands understanding of the relationships between their structures and catalytic properties. Accordingly, this textbook offers the reader a fundamental understanding of

the course of organometallic-catalyzed reactions, starting at the molecular level. The initial chapters explain the principles of catalysis and the elementary steps in organometallic catalysis. The book then explores important organometallic-catalyzed reactions, with a focus on mechanism. Current developments are emphasized throughout. Asymmetric synthesis is covered in depth. Finally, the book examines the catalytic behavior of particular metalloenzymes. A look at nitrogen fixation offers a comparative examination of the three major areas of catalysis - homogeneous, heterogeneous, and enzymatic. In addition to problems, the textbook offers solutions, making the book an invaluable learning tool. It is a must-have for advanced students in chemistry and biochemistry, as well as for inorganic and organic chemists, for those working with organometallics, and for those specializing in catalysis.

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