

Organic Polymer Chemistry An Introduction To The Organic Chemistry Of Adhesives Fibres Paints Plastics And Rubbers

Written in the perspective of an experimental chemist, this book puts together some fundamentals from chemistry, solid state physics and quantum chemistry, to help with understanding and predicting the electronic and optical properties of organic semiconductors, both polymers and small molecules. The text is intended to assist graduate students and researchers in the field of organic electronics to use theory to design more efficient materials for organic electronic devices such as organic solar cells, light emitting diodes and field effect transistors. After addressing some basic topics in solid state physics, a comprehensive introduction to molecular orbitals and band theory leads to a description of computational methods based on Hartree-Fock and density functional theory (DFT), for predicting geometry conformations, frontier levels and energy band structures. Topological defects and transport and optical properties are then addressed, and one of the most commonly used transparent conducting polymers, PEDOT:PSS, is described in some detail as a case study.

Introduction to Polymer Chemistry provides undergraduate students with a much-needed, well-rounded presentation of the principles and applications of natural, synthetic, inorganic, and organic polymers. With an emphasis on the environment and green chemistry and materials, this fourth edition continues to provide detailed coverage of natural and synthetic giant molecules, inorganic and organic polymers, elastomers, adhesives, coatings, fibers, plastics,

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blends, caulks, composites, and ceramics. Building on undergraduate work in foundational courses, the text fulfills the American Chemical Society Committee on Professional Training (ACS CPT) in-depth course requirement

Spanning the entire field from fundamentals to applications in material science, this one-stop source is the first comprehensive reference for polymer, physical and surface chemists, materials scientists, chemical engineers, and those chemists working in industry. From the contents: * Introduction: Living Free Radical Polymerization and the RAFT Process * Fundamental Structure-Reactivity Correlations Governing the RAFT Process * Mechanism and Kinetics * The RAFT Process as a Kinetic Tool * Theory and Practice in Technical Applications * RAFT Polymerization in Bulk and Organic Solvents, as well as Homogeneous Aqueous Systems * Emulsion and Mini-Emulsion Polymerization * Complex Architecture Design * Macromolecular Design via the Interchange of Xanthates * Surface Modification * Stability and Physical Properties of RAFT Polymers * Novel Materials: From Drug Delivery to Opto-Electronics * Outlook and Future Developments

Since the introduction of FT-NMR spectroscopy around five decades ago, NMR has achieved significant advances in hardware and methodologies, accompanied with the enhancement of spectral resolution and signal sensitivity. Rapid developments in the polymers field mean that accurate and quantitative characterization of polymer structures and dynamics is the keystone for precisely regulating and controlling the physical and chemical properties of the polymer. This book specifically focuses on NMR investigation of complex polymers for the polymer community as well as NMR spectroscopists, and will push the development of both fields. It covers the latest advances, for example high field DNP and ultrafast MAS methodologies, and

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show how these novel NMR methods characterize various synthetic and natural polymers.

Publisher Description

This book focuses on polymer–clay nanocomposite materials. It introduces readers to polymers, clays, and organo-clay and discusses the nature of interparticle interactions and physical adsorption, which are predominant in the synthesis of organo-clay; conversion of clay to organo-clay; interactions between functional groups in the interlayer region of clay and modifier ions; synthesis of organo-clays and their uses; and the commercial utilization of organo-clays. The text then covers the preparation of polymer–clay nanocomposites and their characterization, properties, performance, and applications. The primary goal of this book is to aid readers who wish to engage in the research and development of polymer–clay nanocomposites and to offer them an overview of the commonly used polymer–clay nanocomposites and their origins, manufacture, properties, and potential applications. This book will serve as a general introduction to researchers just entering the field and as a useful reference for scholars from other subfields.

“Highly recommended!” – CHOICE New Edition Offers Improved Framework for Understanding Polymers Written by well-established professors in the field, *Polymer Chemistry, Second Edition* provides a well-rounded and articulate examination of polymer properties at the molecular level. It focuses on fundamental principles based on underlying chemical structures, polymer synthesis, characterization, and properties. Consistent with the previous edition, the authors emphasize the logical progression of concepts, rather than presenting just a catalog of facts. The book covers topics that appear prominently in current polymer science journals. It also provides mathematical tools as needed, and fully derived

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problems for advanced calculations. This new edition integrates new theories and experiments made possible by advances in instrumentation. It adds new chapters on controlled polymerization and chain conformations while expanding and updating material on topics such as catalysis and synthesis, viscoelasticity, rubber elasticity, glass transition, crystallization, solution properties, thermodynamics, and light scattering. *Polymer Chemistry, Second Edition* offers a logical presentation of topics that can be scaled to meet the needs of introductory as well as more advanced courses in chemistry, materials science, and chemical engineering. *Polymer Solutions: An Introduction to Physical Properties* offers a fresh, inclusive approach to teaching the fundamentals of physical polymer science. Students, instructors, and professionals in polymer chemistry, analytical chemistry, organic chemistry, engineering, materials, and textiles will find Iwao Teraoka's text at once accessible and highly detailed in its treatment of the properties of polymers in the solution phase. Teraoka's purpose in writing *Polymer Solutions* is twofold: to familiarize the advanced undergraduate and beginning graduate student with basic concepts, theories, models, and experimental techniques for polymer solutions; and to provide a reference for researchers working in the area of polymer solutions as well as those in charge of chromatographic characterization of polymers. The author's incorporation of recent advances in the instrumentation of size-exclusion chromatography, the method by which polymers are analyzed, renders the text particularly topical. Subjects discussed include: Real, ideal, Gaussian, semirigid, and branched polymer chains Polymer solutions and thermodynamics Static light scattering of a polymer solution Dynamic light scattering and diffusion of polymers Dynamics of dilute and semidilute polymer solutions Study questions at the end of each chapter not only provide students with the

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opportunity to test their understanding, but also introduce topics relevant to polymer solutions not included in the main text. With over 250 geometrical model diagrams, Polymer Solutions is a necessary reference for students and for scientists pursuing a broader understanding of polymers.

Information technology is essential to our daily life, and the limitations of silicone based memory systems mean a growing amount of research is focussed on finding an inexpensive alternative to meet our needs and allow the continued development of the industry. Inorganic silicone based technology is increasingly costly and complex and is physically limited by the problems of scaling down. Organic electrical memory devices are comparatively low cost, offer flexibility in terms of chemical structure, are compatible with flexible substrates and allow easy processing. For these reasons polymeric memory nanoscale materials are considered by many to be a potential substitute for conventional semiconductor memory systems. This edited book focusses solely on organic memory devices, providing a full background and overview of the area before bringing the reader up to date with the current and ongoing research in this area. The broad appeal of this book will be applicable to a wide range of researchers and those working in industry, in particular those working in materials, electrical and chemical engineering.

This book deals with the organic chemistry of polymers which find technological use as adhesives, fibres, paints, plastics and rubbers. For the most part, only polymers which are of commercial significance are considered and the primary aim of the book is to relate theoretical aspects to industrial practice. The book is mainly intended for use by students in technical institutions and universities who are specializing in polymer science and by graduates who

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require an introduction to this field. Several excellent books have recently appeared dealing with the physical chemistry of polymers but the organic chemistry of polymers has not received so much attention. In recognition of this situation and because the two aspects of polymer chemistry are often taught separately, this book deals specifically with organic chemistry and topics of physical chemistry have been omitted. Also, in this way the book has been kept to a reasonable size. This is not to say that integration of the two areas of polymer science is undesirable; on the contrary, it is of the utmost importance that the inter-relationship should be appreciated. I wish to record my thanks to my colleagues with whom I have had many helpful discussions, particularly Mrs S. L. Radchenko. I also thank Miss E. Friesen for obtaining many books and articles on my behalf and Mr H. Harms for encouragement and assistance. I am also grateful to Mrs M. Stevens who skilfully prepared the manuscript. Department of Chemical and Metallurgical Technology, Ryerson Polytechnical Institute, K. J. S.

An Introduction to Polymer Chemistry focuses on the fundamental chemistry of synthetic organic polymers of high molecular weight. This book explains the basic principles of polymer chemistry, from significant methods of molecular weight determination to the simpler mechanisms of polymerization. The osmotic, light scattering, and viscosity methods of molecular weight determination are fully discussed together with the kinetics of selected examples of condensation and free-radical addition polymerization. The main features of ionic polymerization are also elaborated. This text, however, does not cover the thermodynamics of polymer solutions or the methods of structure determination. This publication is a good reference to university and technical college students researching on polymer chemistry.

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Paints, Plastics, and Rubbers Springer Science & Business Media

This revised and updated Second Edition of Polymer Synthesis II continues in the tradition of Volume I in presenting detailed laboratory instructions for the preparation of various polymers. Each chapter is organized by functional groups, and each chapter not only presents preparative methods, but also includes a brief introductory summary, reviews of the very latest journal articles and patents, and safety hazards and precautions. Procedures have been chosen on the basis of safety considerations and ease of being carried out with standard laboratory equipment. This comprehensive treatment of each polymer group makes Polymer Synthesis II an indispensable guide for industrial and academic chemists as well as for students in the field. Key Features * This revised edition: * Covers each polymer class, heavily referencing these with patent literature to illustrate commercial applications * Provides new and updated information for each functional group, including: * Curing agents for epoxy resins * Polymerization of vinyl ethers and copolymers * Polyvinyl silfides * Polymerization of vinyl pyrrolidone and copolymers * Features expanded data tables and updated references * Presents numerous citations to new catalysts for each polymer preparation involving ureas * Includes a new section--Complex Formulation--involving the preparation of polyacrylic acid and its copolymers * Contains many new preparations, including: * Preparation of t-butyl acrylate copolymers using the Teyssie Method * Template polymerization of vinylimidazole on polymethacrylic acid * Polymerization of aqueous acrylic acid using AIBN * Preparation of polyketals by transketalization * Copolymerization of maleic anhydride with ethyl vinyl ether * Complex and template polymerizations

This book has been designed to appeal to both chemists working in, and new to, the area of

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polymer synthesis. It contains detailed instructions for the preparation of a wide-range of polymers by a wide variety of different techniques, and describes how this synthetic methodology can be applied to the development of new materials. It includes details of well-established techniques, e.g. chain-growth or step-growth processes together with more up-to-date examples using methods such as atom-transfer radical polymerisation. Less-well known procedures are also included, e.g. electrochemical synthesis of conducting polymers and the preparation of liquid crystalline elastomers with highly ordered structures. Other topics covered include general polymerisation methodology, controlled/'living' polymerisation methods, the formation of cyclic oligomers during step-growth polymerisation, the synthesis of conducting polymers based on heterocyclic compounds, dendrimers, the preparation of imprinted polymers and liquid crystalline polymers. The main bulk of the text is preceded by an introductory chapter detailing some of the techniques available to the scientist for the characterisation of polymers, both in terms of their chemical composition and in terms of their properties as materials. The book is intended not only for the specialist in polymer chemistry, but also for the organic chemist with little experience who requires a practical introduction to the field.

There is, at present, no scarcity of polymer textbooks in the English language. Some of them attempt to cover the entire field, others focus their attention on certain parts of it, e.g., organic chemistry, physical chemistry, solid state physics, etc. This situation must necessarily raise the question, "Why publish another book?" and, even more, "Why translate a book which exists already in German?" and is to a lesser or greater extent legible and comprehensible to many English speaking scientists. It appears that a justification can be found in the special character

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of its content and presentation. As far as content is concerned, Vollmert's book is more encompassing than most existing treatises and, in this sense, almost represents a hybrid between a "textbook" and a "handbook." Numerous figures and tables convey directly a wealth of data. On the other hand, the text is designed to be educational and, in many instances, goes a long way to explain why certain properties are observed and why certain processes take place. These excursions into the intellectual clarification of somewhat complicated phenomena are a refreshing and unusual interruption of the main stream which presents synthesis, characterization and properties of polymeric systems in the classical way.

Timberlake's *Chemistry: An Introduction to General, Organic, and Biological Chemistry* is designed to help prepare students for health-related careers, such as nursing, dietetics, respiratory therapy, and environmental or agricultural science. Assuming no prior knowledge of chemistry, it aims to make this course an engaging and positive experience by relating the structure and behavior of matter to its role in health and the environment. Timberlake maintains the clear, friendly writing style and the real-world, health-related applications that have made this text a leader in the discipline. The Eleventh Edition introduces more problem-solving strategies-including new Concept Checks, more Guides to Problem Solving, and more conceptual, challenge, and combined problems.

This comprehensive textbook describes the synthesis, characterization and technical and engineering applications of polymers. Offering a broad and balanced introduction to the basic concepts of macromolecular chemistry and to the synthesis and physical chemistry of polymers, it is the ideal text for graduate students and advanced Masters

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students starting out in polymer science. Building on the basic principles of organic chemistry and thermodynamics, it provides an easily understandable and highly accessible introduction to the topic. Step by step, readers will obtain a detailed and well-founded understanding of this vibrant and increasingly important subject area at the intersection between chemistry, physics, engineering and the life sciences. Following an approach different from many other textbooks in the field, the authors, with their varying backgrounds (both from academia and industry), offer a new perspective. Starting with a clear and didactic introduction, the book discusses basic terms and sizes and shapes of polymers and macromolecules. There then follow chapters dedicated to polymers in solutions, molar mass determination, and polymers in the solid state, incl. (partially) crystalline or amorphous polymers as well as their application as engineering materials. Based on this information, the authors explain the most important polymerization methods and techniques. Often neglected in other textbooks, there are chapters on technical polymers, functional polymers, elastomers and liquid crystalline polymers, as well as polymers and the environment. An overview of current trends serves to generate further interest in present and future developments in the field. This book is the English translation of the successful German textbook "Polymere", which was awarded the Chemical Industry in Germany's 2015 literature Prize ("Literaturpreis des Fonds der Chemischen Industrie") for its innovative, novel approach, and its good accessibility and readability, while at the same time providing comprehensive coverage of the field of

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polymer science.

Introduction CHEMISTRYChemical Structure Chain Polymerizations Non-Chain Polymerizations PHYSICAL CHEMISTRYMolecule Size and Shape Solution Thermodynamics Polymer Hydrodynamics PHYSICSPolymer Assemblies Transitions and Relaxations Solid State Properties TECHNOLOGYAuxiliaries Elastomers Fibers Plastics Appendix

Brydson's Plastics Materials, Eighth Edition, provides a comprehensive overview of the commercially available plastics materials that bridge the gap between theory and practice. The book enables scientists to understand the commercial implications of their work and provides engineers with essential theory. Since the previous edition, many developments have taken place in plastics materials, such as the growth in the commercial use of sustainable bioplastics, so this book brings the user fully up-to-date with the latest materials, references, units, and figures that have all been thoroughly updated. The book remains the authoritative resource for engineers, suppliers, researchers, materials scientists, and academics in the field of polymers, including current best practice, processing, and material selection information and health and safety guidance, along with discussions of sustainability and the commercial importance of various plastics and additives, including nanofillers and graphene as property modifiers. With a 50 year history as the principal reference in the field of plastics material, and fully updated by an expert team of polymer scientists and

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engineers, this book is essential reading for researchers and practitioners in this field. Presents a one-stop-shop for easily accessible information on plastics materials, now updated to include the latest biopolymers, high temperature engineering plastics, thermoplastic elastomers, and more Includes thoroughly revised and reorganised material as contributed by an expert team who make the book relevant to all plastics engineers, materials scientists, and students of polymers Includes the latest guidance on health, safety, and sustainability, including materials safety data sheets, local regulations, and a discussion of recycling issues

Over the last twenty years, the field of the chemistry of polymerization witnessed enormous growth through the development of new concepts, catalysts, processes etc. Examples are: non classical living polymerizations (group transfer polymerization, living carbocationic polymerization, living radical polymerization and living ring-opening metathesis polymerization (ROMP)); new catalysts (metallocenes and late transition metal catalysts for stereospecific polymerization, Schrock and Grubbs catalyst for ROMP among others) and new processes such as miniemulsion, microemulsion polymerization and dispersion polymerization (in polar solvents). Apart from the developments in the chemistry of polymerization, methods have been developed for the evaluation of highly reliable rate constants of propagation in radical as well as cationic polymerization. All these have revolutionized the field of synthetic polymer chemistry. In the book, fundamentals of both the new and old polymerization chemistry have been

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dealt with. The new chemistry has been given nearly equal space along with the old. With such a wide diversity of properties and applications, is it any wonder that industry and academia have such a fascination with polymers? A solid introduction to such an enormous and important field is critical to the modern polymer scientist-to-be, but most of the available books do not stress practical problem solving or include recent advances. Serving as the polymer book for the new millennium, Introduction to Polymer Science and Chemistry: A Problem Solving Approach unites the fundamentals of polymer science and polymer chemistry in a seamless presentation. Emphasizing polymerization kinetics, the author uses a unique question-and-answer approach when developing theory or introducing new concepts. The first four chapters introduce polymer science, focusing on physical and molecular properties, solution behavior, and molecular weights. The remainder of the book explores polymer chemistry, devoting individual, self-contained chapters to the main types of polymerization reactions: condensation; free radical; ionic; coordination; and ring-opening. It introduces recent advances such as supramolecular polymerization, hyperbranching, photoemulsion polymerization, the grafting-from polymerization process, polymer brushes, living/controlled radical polymerization, and immobilized metallocene catalysts. With numerical problems accompanying the discussion at every step along with numerous end-of-chapter exercises, Introduction to Chemical Polymer Science: A Problem Solving Approach is an ideal introductory text and self-study vehicle for mastering the

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principles and methodologies of modern polymer science and chemistry.

Polymers with redox properties are electroactive macromolecules containing localized sites or groups that can be oxidized and reduced. Redox Polymers for Energy and Nanomedicine highlights trends in the chemistry, characterization and application of polymers with redox properties. Chapters cover batteries, supercapacitors, solar cells, biofuel cells, thermoelectric cells, drug delivery, biosensors, actuators and smart surfaces. The book will be of interest to graduate students and researchers working in polymer science, electrochemistry, energy research and nanomedicine.

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.

This revolutionary and best-selling resource contains more than 200 pages of additional information and expanded discussions on zeolites, bitumen, conducting polymers, polymerization reactors, dendrites, self-assembling nanomaterials, atomic force

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microscopy, and polymer processing. This exceptional text offers extensive listings of laboratory exercises and demonstrations, web resources, and new applications for in-depth analysis of synthetic, natural, organometallic, and inorganic polymers. Special sections discuss human genome and protonics, recycling codes and solid waste, optical fibers, self-assembly, combinatorial chemistry, and smart and conductive materials.

This book gives the reader an introduction to the field of surfactants in solution as well as polymers in solution. Starting with an introduction to surfactants the book then discusses their environmental and health aspects. Chapter 3 looks at fundamental forces in surface and colloid chemistry. Chapter 4 covers self-assembly and 5 phase diagrams. Chapter 6 reviews advanced self-assembly while chapter 7 looks at complex behaviour. Chapters 8 to 10 cover polymer adsorption at solid surfaces, polymers in solution and surface active polymers, respectively. Chapters 11 and 12 discuss adsorption and surface and interfacial tension, while Chapters 13- 16 deal with mixed surfactant systems. Chapter 17, 18 and 19 address microemulsions, colloidal stability and the rheology of polymer and surfactant solutions. Wetting and wetting agents, hydrophobization and hydrophobizing agents, solid dispersions, surfactant assemblies, foaming, emulsions and emulsifiers and microemulsions for soil and oil removal complete

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the coverage in chapters 20-25.

'An excellent textbook for an advanced undergraduate or introductory graduate course on polymer chemistry. ...The book is easy to read and understand. The emphasis on commercially important materials makes it a definite choice for a textbook.' -Microchemical Journal 'This excellent, well-written book, suitable for advanced undergraduates and graduate level classes in polymer syntheses, would also be useful as a general resource book....thoroughly referenced, and contain[s] excellent problem sets.' -Choice This outstanding text combines comprehensive discussions of reaction mechanisms of polymer chemistry with detailed descriptions of practical industrial applications. Intended for graduate students and professionals, this text examines topics at the forefront of today's research-including high performance materials, polymeric reagents and catalysts, and ultraviolet light curing of polymeric coatings. Each chapter contains helpful review questions reinforcing key points. The book also features useful appendixes describing two highly applicable computer programs.

This book is divided into 5 sections starting with an historic perspective and fundamental aspects on the synthesis and recognition by imprinted polymers. The second section contains 8 up-to-date overview chapters on current approaches to molecular and ion imprinting. This is followed by two chapters on

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new material morphologies and in the last two sections various analytical applications of imprinted polymers are given, with the last four chapters devoted to the promising field of imprinted polymers in chemical sensors. The authors of this volume have widely different backgrounds; mainly polymer chemistry, organic chemistry, biochemistry and analytical chemistry, which means that this book has an interdisciplinary character and should appeal to a broad audience. The new edition of a classic text and reference The large chains of molecules known as polymers are currently used in everything from "wash and wear" clothing to rubber tires to protective enamels and paints. Yet the practical applications of polymers are only increasing; innovations in polymer chemistry constantly bring both improved and entirely new uses for polymers onto the technological playing field. Principles of Polymerization, Fourth Edition presents the classic text on polymer synthesis, fully updated to reflect today's state of the art. New and expanded coverage in the Fourth Edition includes: * Metallocene and post-metallocene polymerization catalysts * Living polymerizations (radical, cationic, anionic) * Dendrimer, hyperbranched, brush, and other polymer architectures and assemblies * Graft and block copolymers * High-temperature polymers * Inorganic and organometallic polymers * Conducting polymers * Ring-opening polymerization * In vivo and in vitro polymerization Appropriate for both

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novice and advanced students as well as professionals, this comprehensive yet accessible resource enables the reader to achieve an advanced, up-to-date understanding of polymer synthesis. Different methods of polymerization, reaction parameters for synthesis, molecular weight, branching and crosslinking, and the chemical and physical structure of polymers all receive ample coverage. A thorough discussion at the elementary level prefaces each topic, with a more advanced treatment following. Yet the language throughout remains straightforward and geared towards the student. Extensively updated, Principles of Polymerization, Fourth Edition provides an excellent textbook for today's students of polymer chemistry, chemical engineering, and materials science, as well as a current reference for the researcher or other practitioner working in these areas.

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

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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.

This book, based on lectures given at the Polytechnic of Milan, gives a broad overview of the field of polymer dynamics. In these lectures the aim is to stress the fundamental concepts of the behaviour of polymers without drawing on the more advanced mathematical formalism which often obscures the natural elegance of the subject matter. Professor De Gennes is one of the most distinguished workers in the field of material science. Therefore this book will be welcomed by both the experienced researcher in the area and the interested layman. It will be of particular value to graduate students.

This high school textbook introduces polymer science basics, properties, and uses. It starts with a broad overview of synthetic and natural polymers and then covers synthesis and preparation, processing methods, and demonstrations and experiments. The history of polymers is discussed alongside the s
Focuses on polymer chemistry. This text is suitable for students who have

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studied in an Indian University for a BSc degree.

Now in its second edition, this widely used text provides a unique presentation of today's polymer science. It is both comprehensive and readable. The authors are leading educators in this field with extensive background in industrial and academic polymer research. The text starts with a description of the types of microstructures found in polymer

A comprehensive overview of different porous polymer systems focusing on structure design, synthesis method and properties.

Introduction to Polymers, Second Edition discusses the synthesis, characterization, structure, and mechanical properties of polymers in a single text, giving approximately equal emphasis to each of these major topics. It has thus been possible to show the interrelationship of the different aspects of the subject in a coherent framework. The book has been written to be self-contained, with most equations fully derived and critically discussed. It is supported by a large number of diagrams and micrographs and is fully referenced for more advanced reading. Problems have been supplied at the end of each chapter so that students can test their understanding and practice the manipulation of data. Self-healing is a well-known phenomenon in nature: a broken bone merges after some time and if skin is damaged, the wound will stop bleeding and heals again.

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This concept can be mimicked in order to create polymeric materials with the ability to regenerate after they have suffered degradation or wear. Already realized applications are used in aerospace engineering, and current research in this fascinating field shows how different self-healing mechanisms proven successful by nature can be adapted to produce even more versatile materials. The book combines the knowledge of an international panel of experts in the field and provides the reader with chemical and physical concepts for self-healing polymers, including aspects of biomimetic processes of healing in nature. It shows how to design self-healing polymers and explains the dynamics in these systems. Different self-healing concepts such as encapsulated systems and supramolecular systems are detailed. Chapters on analysis and friction detection in self-healing polymers and on applications round off the book.

Carraher's Polymer Chemistry, Tenth Edition integrates the core areas of polymer science. Along with updating of each chapter, newly added content reflects the growing applications in Biochemistry, Biomaterials, and Sustainable Industries. Providing a user-friendly approach to the world of polymeric materials, the book allows students to integrate their chemical knowledge and establish a connection between fundamental and applied chemical information. It contains all of the elements of an introductory text with synthesis, property, application, and

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characterization. Special sections in each chapter contain definitions, learning objectives, questions, case studies and additional reading.

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