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Handbook of Polymer Crystallization Crystallization of Polymers: Volume 2, Kinetics and Mechanisms Crystallization of Polymers Polymer Crystallization Crystallization of Polymers: Volume 1, Equilibrium Concepts Progress in Understanding of Polymer Crystallization Polymer Crystallization Polymer Crystallization Polymer Crystallization Crystallization of Polymers Flow-Induced Crystallization of Polymers Crystallization of Polymers Crystallization in Multiphase Polymer Systems Crystallization Modalities in Polymer Melt Processing Crystals and Crystallinity in Polymers Polymer Crystallization I Polymer Crystallization II Crystallization of Polymers Interphases and Mesophases in Polymer Crystallization I Interphases and Mesophases in Polymer Crystallization III Interphases and Mesophases in Polymer Crystallization II Interphases and Mesophases in Polymer Crystallization II Polymer Crystallization Mathematical Modelling for Polymer Processing Interphases and Mesophases in Polymer Crystallization I Interphases and Mesophases in Polymer Crystallization I Introduction to Polymer Crystallization Controlling the Morphology of Polymers Recent Advances in the Field of Crystallization and Fusion of Polymers Flow induced crystallization of polymers. Impact to processing and manufact properties Crystallization of Polymers Crystallization as Studied by Broadband Dielectric Spectroscopy Crystallization of Polymers: Volume 2, Kinetics and Mechanisms Polymer Morphology Modeling and Simulation of Crystallization Processes in Polymer Melt Flows Phase Transitions in Polymers: The Role of Metastable States Flow-induced Crystallization in Polymer Systems Developments in Crystalline Polymers-1 Crystallization Modalities in Polymer Melt Processing Fundamental Polymer Science

Handbook of Polymer Crystallization 2013-07-01 polymeric crystals are more complex in nature than other materials crystal structures due to significant structural disorder present the only comprehensive reference on polymer crystallization handbook of polymer crystallization provides readers with a broad in depth guide on the subject covering the numerous problems encountered during crystallization as well as solutions to resolve those problems to achieve the desired result edited by leading authorities in the field topics explored include neat polymers heterogeneous systems polymer blends polymer composites orientation induced crystallization crystallization in nanocomposites and crystallization in complex thermal processing conditions

Crystallization of Polymers: Volume 2, Kinetics and Mechanisms 2004-09-30 in crystallization of polymers 2nd edition leo mandelkern provides a self contained comprehensive and up to date treatment of polymer crystallization volume 2 of this edition provides an authoritative account of the kinetics and mechanisms of polymer crystallization building from the equilibrium concepts presented in volume 1 as crystalline polymers rarely if ever achieve their equilibrium state this books serves as a bridge between equilibrium concepts and the state that is finally achieved with a comprehensive treatment of the surrounding theories and experimental results from simple to complex polymer systems this book will be an invaluable reference work for all chemists physicists and materials scientists working in the area of polymer crystallization

Crystallization of Polymers 2012-12-06 since the discovery that polymer single crystals are composed of chain folded macromolecules in 1957 the crystallization of polymers has attracted considerable interest and still provides fascinating and fruitful areas of research only a few books have been fully devoted to the crystallization of polymers in the past this book contains the proceedings of the nato arw devoted to the crystallization of polymers which took place in september 1992 at the university of mons hainaut belgium in view of the variety of papers devoted to the crystallization of polymers this book will be used in the next few years as a reference book for scientists concerned in the field of polymer physical chemistry crystallization of polymers is mainly devoted to the experimental and theoretical study of the crystallization of synthetic polymers as a kinetic study of the growth of polymer crystals should always be preceded by a morphological or a structural investigation the structure the morphology of polymer crystals and more particularly the lamellar and supralamellar organizations as well as the nature of the crystal amorphous interface are reviewed and discussed

Polymer Crystallization 2023-07-03 control the development of polymer crystals with this groundbreaking introduction polymer crystallization is a crucial component of polymer development

that impacts processing applications presentation and more intervention in the polymer crystallization process in the form of nanofilters compatibilizers and more has the potential to improve optical and chemical properties improve degrees of crystallinity and increase hardness of polymer composites the myriad applications of crystalline polymers make this one of the most exciting and fast growing fields in polymer research polymer crystallization provides a comprehensive introduction to this field and its most important recent developments it characterizes and analysis an expansive range of crystalline polymers and discusses possible mechanisms for influencing their crystallization processes to impact a variety of outcomes and applications these applications include industries from food packaging to automotive parts to medical and aerospace materials polymer crystallization readers will also find detailed treatment of polymer morphology rheology modeling and more thorough introduction to the fundamentals of polymer crystallization discussion of environmental safety issues and avenues for future research polymer crystallization is a useful reference for materials scientists polymer scientists biomedical scientists and advanced undergraduate and graduate students in these and related fields

Crystallization of Polymers: Volume 1, Equilibrium Concepts 2002-09-19 first published in 2002 from an original 1964 edition in the crystallization of polymers 2nd edition leo mandelkern provides a self contained treatment of polymer crystallization all classes of macromolecules are included and the approach is through the basic disciplines of chemistry and physics the book discusses the thermodynamics and physical properties that accompany the morphological and structural changes that occur when a collection of molecules of very high molecular weight are transformed from one state to another volume 1 is a presentation of the equilibrium concepts that serve as a basis for the subsequent volumes in this volume the author shows that knowledge of the equilibrium requirements is vital to understanding all aspects of the polymer crystallization process and the final state that eventually evolves this book will be an invaluable reference work for all chemists physicists and materials scientists who work in the area of polymer crystallization

Progress in Understanding of Polymer Crystallization 2007-02-05 in the context of polymer crystallization there are several still open and often controversially debated questions the present volume addresses issues such as novel general views and concepts it presents new ideas in a connected and accessible way the intention is thus not only to provide a summary of the present state of the art to all active works but to provide an entry point to newcomer and graduate

students entering the field

Polymer Crystallization 2001 table of contents

Polymer Crystallization 2008-01-11 the classical view on polymer crystallization basically focused on the explanation of a few macroscopically observable parameters like the thickness of the resulting lamellar structure and the corresponding growth rates however the emerging paradigm for the description of chain crystals is too simple and cannot account for the complex non equilibrium processes responsible for structure formation on various levels ranging from the nanometer up to the millimeter scale this complexity detected by several novel experimental results led to a renewed interest in this old topic of polymer crystallization these new findings concern the early stages of the crystallization process crystal formation in confined geometries like ultra thin films and the competition between micro phase separation and crystallization in copolymers and blends in particular high spatial resolution techniques such as atomic force microscopy provided deeper insight into the molecular organization of crystallizable polymers computer simulations based on microscopic processes were used to improve our understanding of how polymer crystals are nucleated and how they grow new ideas emerged about possible multistage pathways which are followed during the formation of polymer lamellae the importance and the consequences of the non equilibrium character of polymer crystals got significantly more attention links and analogies to growth phenomena and pattern formation in general are being developed however these ideas are still subject of intensive and controversial discussions

Polymer Crystallization 2014-10-02 in polymer processing the molecular orientation induced by flow has a significant effect on the crystallization kinetics and final morphology of the polymer produced the impact on processing operations and object properties is extremely important and recently scientific and technological researchers have begun to quantify these effects the international conference flow induced crystallization of polymers held in october 2001 in salerno italy was timely and well attended an interdisciplinary approach was taken and presentations were made on topics ranging from real time measurement through modelling to final morphology and properties of polymers invited and other selected contributions from the conference are collected here in this volume of macromolecular symposia

Crystallization of Polymers 1964 the crystallization of polymers 2nd edition provides a self contained comprehensive and up to date treatment of polymer crystallization volume i is a presentation of the equilibrium concepts that serve as a basis for the subsequent volumes it will be an invaluable reference work for all scientists who work in the area

Flow-Induced Crystallization of Polymers 2002-12-20 crystallization in multiphase polymer systems is the first book that explains in depth the crystallization behavior of multiphase polymer systems polymeric structures are more complex in nature than other material structures due to their significant structural disorder most of the polymers used today are semicrystalline and the subject of crystallization is still one of the major issues relating to the performance of semicrystalline polymers in the modern polymer industry the study of the crystallization processes crystalline morphologies and other phase transitions is of great significance for the understanding the structure property relationships of these systems crystallization in block copolymers miscible blends immiscible blends and polymer composites and nanocomposites is thoroughly discussed and represents the core coverage of this book the book critically analyzes the kinetics of nucleation and growth process of the crystalline phases in multi component polymer systems in different length scales from macro to nanoscale various experimental techniques used for the characterization of polymer crystallization process are discussed written by experts in the field of polymer crystallization this book is a unique source and enables professionals and students to understand crystallization behavior in multiphase polymer systems such as block copolymers polymer blends composites and nanocomposites covers crystallization of multiphase polymer systems including copolymers blends and nanocomposites features comprehensive detailed information about the basic research practical applications and new developments for these polymeric materials analyzes the kinetics of nucleation and growth process of the crystalline phases in multi component polymer systems in different length scales from macro to nanoscale

Crystallization of Polymers 2002 structure formation in crystallizing polymers as occurring during processing has not been treated so far in a coherent form this fact explains why this monograph is written as the first book devoted to this subject a quarter of a century ago the underdevelopment of this subject was obvious trial and error dominated in fact other apposite subjects as polymer melt rheology or heat transfer had reached high levels a great number of books has been devoted to them molding of amorphous polymers and the solidification of these polymers by vitrification can nowadays be simulated numerically with a high degree of accuracy in the solidified sample even residual stresses and corresponding birefringence effects can accurately be calculated however semicrystalline polymers which form the majority of industrial polymers have been excluded from these considerations for good reasons in fact great uncertainties existed about the formation of quality determining crystalline structures in particular polyolefins

suffered from this shortcoming in 1983 this fact instigated the polymer research group at the johannes kepler university in linz to start with pertinent activities the urgency of this kind of studies becomes evident if advantages and hitches of these polymers are considered 1 versatility of processing injection molding into a great variety of shapes and sizes from thin walled beakers to garden chairs not to forget pipe and pro le extrusion cable coating ber spinning lm blowing 2 product qualities ductility low density good electric insulation corrosion resistance surface quality

Crystallization in Multiphase Polymer Systems 2017-09-15 provides the tools needed to master and apply the fundamentals of polymer crystallography using core concepts in physics chemistry polymer science and engineering this book sheds new light on the complex field of polymer crystallography enabling readers to evaluate polymer crystallization data and determine the best methods to use for their investigations the authors set forth a variety of tested and proven methods for analyzing ordered and disordered structures in polymer crystals including x ray diffraction electron diffraction and microscopy in addition to the basics the book explores several advanced and emerging topics in the field such as symmetry breaking frustration and the principle of density driven phase formation crystals and crystallinity in polymers introduces two new concepts in crystallinity and crystals in synthetic polymers first crystallinity in polymeric materials is compatible with the absence of true three dimensional long range order second the disorder may be described as a structural feature using the methods of x ray scattering and electron diffraction analysis the book begins by introducing the basic principles and methods for building structural models for the conformation of polymer crystal chains next it covers packing of macromolecules in polymer crystals methods for extracting structural parameters from diffraction data defects and disorder in polymer crystals analytical methods for diffuse scattering from disordered polymer structures crystal habit influence of crystal defects and structural disorder on the physical and mechanical properties of polymeric materials crystals and crystallinity in polymers examines all the possible types of structural disorder generally present in polymer crystals and describes the influence of each kind of disorder on x ray and electron diffraction patterns its comprehensive expert coverage makes it possible for readers to learn and apply the fundamentals of polymer crystallography to solve a broad range of problems

Crystallization Modalities in Polymer Melt Processing 2009-09-18 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

Crystals and Crystallinity in Polymers 2013-08-26 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

Polymer Crystallization I 2016-12-21 with contributions by numerous experts

Polymer Crystallization II 2016-12-21 with contribution by numerous experts

Crystallization of Polymers 2004 the classical view on polymer crystallization basically focused on the explanation of a few macroscopically observable parameters like the thickness of the resulting lamellar structure and the corresponding growth rates however the emerging paradigm for the description of chain crystals is too simple and cannot account for the complex non equilibrium processes responsible for structure formation on various levels ranging from the nanometer up to the millimeter scale this complexity detected by several novel experimental results led to a renewed interest in this old topic of polymer crystallization these new findings concern the early stages of the crystallization process crystal formation in confined geometries like ultra thin films and the competition between micro phase separation and crystallization in copolymers and blends in particular high spatial resolution techniques such as atomic force microscopy provided deeper insight into the molecular organization of crystallizable polymers computer simulations based on microscopic processes were used to improve our understanding of how polymer crystals are nucleated and how they grow new ideas emerged about possible multistage pathways which are followed during the formation of polymer lamellae the importance and the consequences of the non equilibrium character of polymer crystals got significantly more attention links and analogies to growth phenomena and pattern formation in general are being developed however these ideas are still subject of intensive and controversial discussions

Interphases and Mesophases in Polymer Crystallization I 2009-09-02 polymers are substances made of macromolecules formed by thousands of atoms organized in one homopolymers or more copolymers groups that repeat themselves to form linear or branched chains or lattice structures the concept of polymer traces back to the years 1920 s and is one of the most significant ideas of last century it has given great impulse to industry but also to fundamental research including life sciences macromolecules are made of small molecules known as monomers the process that brings monomers into polymers is known as polymerization a fundamental contribution to the industrial production of polymers particularly polypropylene and polyethylene is due to the nobel prize winners giulio natta and karl ziegler the ideas of ziegler and natta date back to 1954 and the process has been improved continuously over the years particularly concerning the design and shaping of the catalysts chapter 1 due to a fasano is devoted to a review of some results concerning the modelling of the ziegler natta polymerization the specific example is the

production of polypropilene the process is extremely complex and all studies with relevant mathematical contents are fairly recent and several problems are still open

Interphases and Mesophases in Polymer Crystallization III 2005-12-02 with contribution by numerous experts

Interphases and Mesophases in Polymer Crystallization II 2009-09-02 this book focuses on controlling morphology of different scales for polymers the authors explain the need for successful control of morphology to yield target macroscopic physical properties in the application of polymers to diverse areas such as engineering materials nanodielectrics and photonic crystals the book combines specialized chapters with an introduction to the morphology of polymers and the range of experimental techniques available to evaluate it

Interphases and Mesophases in Polymer Crystallization II 2005-08-25 the crystallization of polymers 2nd edition provides a self contained comprehensive and up to date treatment of polymer crystallization volume i is a presentation of the equilibrium concepts that serve as a basis for the subsequent volumes it will be an invaluable reference work for all scientists who work in the area

Polymer Crystallization 2003-05-06 this book presents new approaches that offer a better characterization of the interrelationship between crystalline and amorphous phases in recent years the use of dielectric spectroscopy has significantly improved our understanding of crystallization the combination of modern scattering methods using either synchrotron light or neutrons and infrared spectroscopy with dielectrics is now helping to reveal modifications of both crystalline and amorphous phases in turn this yields insights into the underlying physics of the crystallization process in various materials e g polymers liquid crystals and diverse liquids the book offers an excellent introduction to a valuable application of dielectric spectroscopy and a helpful guide for every scientist who wants to study crystallization processes by means of dielectric spectroscopy

Mathematical Modelling for Polymer Processing 2012-12-06 this new edition of volume 2 of leo mandelkern s self contained work is an up to date authoritative account of the kinetics and mechanisms of polymer crystallization progressing from the equilibrium concepts presented in volume 1 it provides a comprehensive treatment of the surrounding theories and experimental results from simple to complex polymer systems the volume will be an invaluable reference work for all chemists physicists and materials scientists working in the area of polymer crystallization

Interphases and Mesophases in Polymer Crystallization I 2005-08-11 with a focus on structure property relationships this book describes how polymer morphology affects properties and how scientists can modify them the book covers structure development theory simulation and processing and discusses a broad range of techniques and methods provides an up to date comprehensive introduction to the principles and practices of polymer morphology illustrates major structure types such as semicrystalline morphology surface induced polymer crystallization phase separation self assembly deformation and surface topography covers a variety of polymers such as homopolymers block copolymers polymer thin films polymer blends and polymer nanocomposites discusses a broad range of advanced and novel techniques and methods like x ray diffraction thermal analysis and electron microscopy and their applications in the morphology of polymer materials

Interphases and Mesophases in Polymer Crystallization I 2005 describing crystallization processes in polymer melt flows involves many effects objective of this work is to capture a selection in a simulation environment for a certain material starting from executing experiments on this means aspects of experimental investigations modeling and special numerical methods used to create a simulation environment will be highlighted because this involves many fields works covering all aspects are rare it is intended to contribute such a work by the publication of this thesis

Introduction to Polymer Crystallization 1966 a classical metastable state possesses a local free energy minimum at infinite sizes but not a global one this concept is phase size independent we have studied a number of experimental results and proposed a new concept that there exists a wide range of metastable states in polymers on different length scales where their metastability is critically determined by the phase size and dimensionality metastable states are also observed in phase transformations that are kinetically impeded on the pathway to thermodynamic equilibrium this was illustrated in structural and morphological investigations of crystallization and mesophase transitions liquid liquid phase separation vitrification and gel formation as well as combinations of these transformation processes the phase behaviours in polymers are thus dominated by interlinks of metastable states on different length scales this concept successfully explains many experimental observations and provides a new way to connect different aspects of polymer physics written by a leading scholar and industry expert presents new and cutting edge material encouraging innovation and future research connects hot topics and leading research in one concise volume

Controlling the Morphology of Polymers 2016-09-06 crystalline or more properly semi crystalline

polymers continue to present major challenges and opportunities to scientists and technologists alike on the one hand scientific understanding of their structure and properties still lags behind that of other economically important but less complicated materials on the other hand there remains very considerable potential for improving properties in systems designed for specific purposes ways are only just being found of transferring inherent molecular properties such as high modulus to the macromolecular solid beyond these are many possibilities of manipulating the organization of chemical and physical textures towards desired ends the chapters in this volume are reports by well known and active researchers on some of the important recent developments of these themes grubb begins with the fundamental and central problem of determining polymeric microstructure polymers suffer by comparison with other materials in that it has not generally been possible to exploit the high resolution of the electron microscope to determine their microstructure in adequate detail however recently ways have been found of studying representative lamellar textures in melt crystallized polymers when fully exploited these must add greatly to our detailed knowledge and provide a firmer fundamental base for future developments radiation damage bears the primary responsibility for restricting electron microscopy in his chapter kener recounts how appreciation of this fact led him into a fascinating study of ever deeper aspects of radiation damage in polyethylene over two decades often controversial but invariably clarifying the basic understanding of an area now of increasing commercial importance

Recent Advances in the Field of Crystallization and Fusion of Polymers 1977 in addition to structure formation in crystallizing polymers and semicrystalline polymers this second edition completes the topic of transport phenomena it also reviews solidification by crystallization during cooling and under flow or pressure which all play an enormous role in polymer melt processing generally there is an intensive interaction between three transport phenomena heat transfer momentum transfer flow rheology and flow induced crystallization the strong interaction between the three transport phenomena is a major challenge when it comes to experimentation and advances in this area are detailed in the book guiding further development of sound modeling this book enables readers to follow an advanced course in polymer processing it is a valuable resource for polymer chemists applied physicists rheologists plastics engineers mold makers and material scientists

Flow induced crystallization of polymers. Impact to processing and material properties 2001 this successor to the popular textbook polymer physics springer 1999 is the result of a quarter

century of teaching experience as well as critical comments from specialists in the various sub fields resulting in better explanations and more complete coverage of key topics with a new chapter on polymer synthesis the perspective has been broadened significantly to encompass polymer science rather than just polymer physics polysaccharides and proteins are included in essentially all chapters while polyelectrolytes are new to the second edition cheap computing power has greatly expanded the role of simulation and modeling in the past two decades which is reflected in many of the chapters additional problems and carefully prepared graphics aid in understanding two principles are key to the textbook s appeal 1 students learn that independent of the origin of the polymer synthetic or native the same general laws apply and 2 students should benefit from the book without an extensive knowledge of mathematics taking the reader from the basics to an advanced level of understanding the text meets the needs of a wide range of students in chemistry physics materials science biotechnology and civil engineering and is suitable for both masters and doctoral level students praise for the previous edition an excellent book well written authoritative clear and concise and copiously illustrated with appropriate line drawings graphs and tables polymer international an extremely useful book it is a pleasure to recommend it to physical chemists and materials scientists as well as physicists interested in the properties of polymeric materials polymer news this valuable book is ideal for those who wish to get a brief background in polymer science as well as for those who seek a further grounding in the subject colloid polymer science the solutions to the exercises are given in the final chapter making it a well thought out teaching text polymer science

Crystallization of Polymers 2002

Crystallization as Studied by Broadband Dielectric Spectroscopy 2020-10-28

Crystallization of Polymers: Volume 2, Kinetics and Mechanisms 2012-07-19

Polymer Morphology 2016-05-16

Modeling and Simulation of Crystallization Processes in Polymer Melt Flows 2020-01-01

Phase Transitions in Polymers: The Role of Metastable States 2008-09-10

Flow-induced Crystallization in Polymer Systems 1979-01-01

Developments in Crystalline Polymers-1 2013-04-17

Crystallization Modalities in Polymer Melt Processing 2018-03-27

Fundamental Polymer Science 2019-12-20

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