

Mechanical Properties Of Solid Polymers

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Understanding Solids Elsevier

Polymer Blends, Volume 1 highlights the importance of polymer blends as a major new branch of macromolecular science. Topics range from polymer-polymer compatibility and the statistical thermodynamics of polymer blends to the phase separation behavior of polymer-polymer mixtures, transport phenomena in polymer blends, and mechanical properties of multiphase polymer blends. The optical behavior, solid state transition behavior, and rheology of polymer blends are also discussed. This book is organized into 10 chapters and begins with an overview of polymer blends, with emphasis on terminology and the effect of molecular weight on the thermodynamics of polymer blends as well as phase equilibria and transitions. The discussion then turns to the miscibility of homopolymers and copolymers, in bulk and in solution, from the experimental and theoretical viewpoints. The chapters that follow explore the statistical thermodynamics of polymer blends, paying particular attention to the Flory and lattice fluid theories, along with the phase relationship in polymer mixtures. The interfacial energy, structure, and adhesion between polymers in relation to the properties of polymer blends are considered. The final chapter examines the phenomena of low molecular weight penetrant transport. Currently accepted models for unsteady-state and steady-state permeation of polymeric materials are presented. A discussion of unsteady-state absorption and desorption behavior observed in a variety of polymer blends complements the treatment of permeation behavior. This book is intended to provide academic and industrial research scientists and technologists with a broad background in current principles and practice concerning mixed polymer systems.

Mechanical Properties of Polymers Springer Science & Business Media

This volume represents a continuation of the Polymer Science and Technology series edited by Dr. D. M. Brewis and Professor D. Briggs. The theme of the series is the production of a number of stand alone volumes on various areas of polymer science and technology. Each volume contains short articles by a variety of expert contributors outlining a particular topic and these articles are extensively cross referenced. References to related topics included in the volume are indicated by bold text in the articles, the bold text being the title of the relevant article. At the end of each article there is a list of bibliographic references where interested readers can obtain further detailed information on the subject of the article. This volume was produced at the invitation of Derek Brewis who asked me to edit a text which concentrated on the mechanical properties of polymers. There are already many excellent books on the mechanical properties of polymers, and a somewhat lesser number of volumes dealing with methods of carrying out mechanical tests on polymers. Some of these books are listed in Appendix 1. In this volume I have attempted to cover basic mechanical properties and test methods as well as the theory of polymer mechanical deformation and hope that the reader will find the approach useful.

The Physics of Deformation and Fracture of Polymers John Wiley & Sons

Surface Phenomena in the Structural and Mechanical Behaviour of Solid Polymers explores the role of various surface phenomena in the structural and mechanical behaviour of amorphous and semicrystalline polymers. This book: Discusses the development of the interfacial surface in the deformation of polymers Examines the healing of interfacial surfaces in polymers Inspects the structure and properties of polymers in thin films and surface layers Evaluates the mechanism of inelastic deformation in glassy amorphous polymers Investigates strain softening and the phenomena taking place upon deformation of polymers in active liquid media Covers the Reh binder effect, or the adsorption reduction of the strength of solids Describes the properties of polymers in environmental or solvent crazing Analyses the interaction of the highly developed surface of crazed polymers with diverse low- and high-molecular mass components Addresses the instability and self-organisation of surface layers in polymers and diverse polymer systems Presents theoretical speculations concerning the structurally mechanical behaviour of 'a rigid coating on a soft substratum' (RCSS) systems Assesses the stress-strain properties of the thin surface layers of polymers and the nanometric coatings deposited on their surfaces Highlights the efficacy of the approaches developed for RCSS systems for the analysis and description of natural phenomena Details the applied aspects of surface phenomena in the structurally mechanical behaviour of polymers Thus, Surface Phenomena in the Structural and Mechanical Behaviour of Solid Polymers provides a useful framework for the development of new and innovative polymer-based materials.

Shape Memory Polymers Cambridge University Press

A concise, self-contained introduction to solid polymers, the mechanics of their behavior and molecular and structural interpretations. This updated edition provides extended coverage of recent developments in rubber elasticity, relaxation transitions, non-linear viscoelastic behavior, anisotropic mechanical behavior, yield behavior of polymers, breaking phenomena, and other fields.

Mechanical Properties of Solid Polymers CRC Press

This volume explores the mechanics of the behaviour of solid polymers, discussing molecular and structural interpretations and emphasizing the physical rather than the engineering approach. Readers are provided with a set of elementary problems and their solutions.

Szycher's Handbook of Polyurethanes, Second Edition Cambridge University Press

This text, now in its second edition, offers an up-to-date, expanded treatment of the behaviour of polymers with regard to material variables and test and use conditions. It highlights general principles, useful empirical rules and practical equations.;Detailing the specific behaviour of many common polymers, the text: places emphasis on time and frequency dependence over temperature dependence; uses contemporary molecular mechanisms to explain creep, stress relaxation, constant strain rate responses and crazing; provides explicit equations to predict responses; supplies a discussion of large deformation multiaxial responses; compares statistical and continuum theories on the same data set; and updates stress-strain behaviour and particulate filled systems.

Polymer Interface and Adhesion Springer Science & Business Media

Provides a comprehensive introduction to the mechanical behaviour of solid polymers. Extensively revised and updated throughout, the second edition now includes new material on mechanical relaxations and anisotropy, composites modelling, non-linear viscoelasticity, yield behaviour and fracture of tough polymers. The accessible approach of the book has been retained with each chapter designed to be self contained and the theory and applications of the subject carefully introduced where appropriate. The latest developments in the field are included alongside worked examples, mathematical appendices and an extensive reference. * Fully revised and updated throughout to include all the latest developments in the field * Worked examples at the end of the chapter * An invaluable resource for students of materials science, chemistry, physics or engineering studying polymer science

Solid State NMR of Polymers Mechanical Properties of Solid Polymers

As a reference book, the Springer Handbook provides a comprehensive exposition of the techniques and tools of experimental mechanics. An informative introduction to each topic is provided, which advises the reader on suitable techniques for practical applications. New topics include biological materials, MEMS and NEMS, nanoindentation, digital photomechanics, photoacoustic characterization, and atomic force microscopy in experimental solid mechanics. Written and compiled by internationally renowned experts in the field, this book is a timely, updated reference for both practitioners and researchers in science and engineering.

Mechanical Properties of Materials John Wiley & Sons

A practical handbook rather than merely a chemistry reference, Szycher's Handbook of Polyurethanes, Second Edition offers an easy-to-follow compilation of crucial new information on polyurethane technology, which is irreplaceable in a wide range of applications. This new edition of a bestseller is an invaluable reference for technologists, marketers, suppliers, and academicians who require cutting-edge, commercially valuable data on the most advanced uses for polyurethane, one of the most important and complex specialty polymers. internationally recognized expert Dr. Michael Szycher updates his bestselling industry "bible" With seven entirely new chapters and five that are revised and updated, this book summarizes vital contents from U.S. patent literature—one of the

most comprehensive sources of up-to-date technical information. These patents illustrate the most useful technology discovered by corporations, universities, and independent inventors. Because of the wealth of information they contain, this handbook features many full-text patents, which are carefully selected to best illustrate the complex principles involved in polyurethane chemistry and technology. Features of this landmark reference include: Hundreds of practical formulations Discussion of the polyurethane history, key terms, and commercial importance An in-depth survey of patent literature Useful stoichiometric calculations The latest "green" chemistry applications A complete assessment of medical-grade polyurethane technology Not biased toward any one supplier ' s expertise, this special reference uses a simplified language and layout and provides extensive study questions after each chapter. It presents rich technical and historical descriptions of all major polyurethanes and updated sections on medical and biological applications. These features help readers better understand developmental, chemical, application, and commercial aspects of the subject.

Introduction to Materials Science Cambridge University Press

Mechanical Properties of Solid Polymers John Wiley & Sons

Applied Mechanics of Polymers Routledge

This book is focused primarily on polymer nanocomposites, based on the author's research experience as well as open literature. The environmental health and safety aspects of nanomaterials and polymer nanocomposites, risk assessment and safety standards, and fire toxicity of polymer nanocomposites, are studied. In the final chapter, a brief overview of opportunities, trends, and challenges of polymer nanocomposites are included. Throughout the book, the theme is developed that polymer nanocomposites are a whole family of polymeric materials whose properties are capable of being tailored to meet specific applications. This volume serves as a general introduction to students and researchers just entering the field and to scholars from other subfields seeking information.

Stress Analysis of Polymers John Wiley & Sons

Viscoelastic behavior reflects the combined viscous and elastic responses, under mechanical stress, of materials which are intermediate between liquids and solids in character. Polymers the basic materials of the rubber and plastic industries and important to the textile, petroleum, automobile, paper, and pharmaceutical industries as well exhibit viscoelasticity to a pronounced degree. Their viscoelastic properties determine the mechanical performance of the final products of these industries, and also the success of processing methods at intermediate stages of production. Viscoelastic Properties of Polymers examines, in detail, the effects of the many variables on which the basic viscoelastic properties depend. These include temperature, pressure, and time; polymer chemical composition, molecular weight and weight distribution, branching and crystallinity; dilution with solvents or plasticizers; and mixture with other materials to form composite systems. With guidance by molecular theory, the dependence of viscoelastic properties on these variables can be simplified by introducing certain ancillary concepts such as the fractional free volume, the monomeric friction coefficient, and the spacing between entanglement loci, to provide a qualitative understanding and in many cases a quantitative prediction of how to achieve desired results. The phenomenological theory of viscoelasticity which permits interrelation of the results of different types of experiments is presented first, with many useful approximation procedures for calculations given. A wide variety of experimental methods is then described, with critical evaluation of their applicability to polymeric materials of different consistencies and in different regions of the time scale (or, for oscillating deformations, the frequency scale). A review of the present state of molecular theory follows, so that viscoelasticity can be related to the motions of flexible polymer molecules and their entanglements and network junctions. The dependence of viscoelastic properties on temperature and pressure, and its descriptions using reduced variables, are discussed in detail. Several chapters are then devoted to the dependence of viscoelastic properties on chemical composition, molecular weight, presence of diluents, and other features, for several characteristic classes of polymer materials. Finally, a few examples are given to illustrate the many potential applications of these principles to practical problems in the processing and use of rubbers, plastics, and fibers, and in the control of vibration and noise. The third edition has been brought up to date to reflect the important developments, in a decade of exceptionally active research, which have led to a wider use of polymers, and a wider

recognition of the importance and range of application of viscoelastic properties. Additional data have been incorporated, and the book's chapters on dilute solutions, theory of undiluted polymers, plateau and terminal zones, cross-linked polymers, and concentrated solutions have been extensively rewritten to take into account new theories and new experimental results. Technical managers and research workers in the wide range of industries in which polymers play an important role will find that the book provides basic information for practical applications, and graduate students in chemistry and engineering will find, in its illustrations with real data and real numbers, an accessible introduction to the principles of viscoelasticity.

Mechanical Properties of Polymers and Composites, Second Edition Springer Science & Business Media

This book covers properties, processing, and applications of conducting polymers. It discusses properties and characterization, including photophysics and transport. It then moves to processing and morphology of conducting polymers, covering such topics as printing, thermal processing, morphology evolution, conducting polymer composites, thin films

Fundamentals, Properties, and Applications of Polymer Nanocomposites John Wiley & Sons Incorporated

Combining materials science, mechanics, implant design and clinical applications, this self-contained text provides a complete grounding to the field.

Mechanical Properties of Solid Polymers Elsevier

Provides a comprehensive introduction to the mechanical behaviour of solid polymers. Extensively revised and updated throughout, the second edition now includes new material on mechanical relaxations and anisotropy, composites modelling, non-linear viscoelasticity, yield behaviour and fracture of tough polymers. The accessible approach of the book has been retained with each chapter designed to be self contained and the theory and applications of the subject carefully introduced where appropriate. The latest developments in the field are included alongside worked examples, mathematical appendices and an extensive reference. Fully revised and updated throughout to include all the latest developments in the field Worked examples at the end of the chapter An invaluable resource for students of materials science, chemistry, physics or engineering studying polymer science

Mechanical Properties of Solid Polymers I. K. International Pvt Ltd

This book discusses polymers from a mechanical engineering perspective, treating stresses and deformations in polymeric structural components.

Cellular Solids Smithers Rapra

A physical, mechanism-based presentation of the plasticity and fracture of polymers, covering industrial scale applications through to nanoscale biofluidic devices.

Mechanics of Solid Polymers Springer Science & Business Media

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Elsevier

The book discusses the latest developments in the entire field of three-dimensional free-radical polymerization. It is the first book on the subject comprising the research results of the last 40 years and will benefit the specialist in new high-tech areas.

An Introduction to the Mechanical Properties of Solid Polymers Cambridge University Press

New technologies demand new materials. Polymer composites, with their wide range of possible fillers and polymers, open the way to an enormous range of materials with differing chemical, physical, and mechanical properties. The ultimate goal of polymer composite research is to formulate procedures that will lead to the design of composites with preset, i.e. specified, properties. Based on many years' experience in the field, the authors prepare the way towards just such a design procedure. The key element is the analysis and classification of the state of the filler-polymer interfaces from the point of view of their acid-base adsorption interactions. These interfacial phenomena play a pivotal role in determining overall properties of the composite: its rheological behaviour, its structural properties, catalytic effects in polymerization and polycondensation, and other technological characteristics. The book discusses and evaluates the extensive previous research scattered throughout the literature in Eastern Europe and the West, presents numerous experimental studies, and sets new benchmarks for the analysis of polymer composites. The book is required for researchers wanting to keep abreast of the progress in the burgeoning fields of polymer analysis and design.